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A GENETICAL SURVEY IN CHENCHU, SOUTH INDIA: BLOOD, TASTE AND SECRETION.

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THE results of the investigation reported here relate to the Chenchu, an aboriginal population of south India.

Eight genetic characters have been studied as follows: (i) A₁-A₂-B-O blood groups. (ii) M-N-S blood types. (iii) Rh blood types and variants. (iv) Lewis (Le^a) blood group and its correlation with A, B or H substances in saliva. (v) P blood group. (vi) Duffy blood group. (vii) Kell blood group. (viii) Ability to taste phenyl thiocarbamide.

It is recognized that the populations of India are so numerous and complicated that a total genetical survey of the country could be accomplished only by many serologists over a considerable time.

Boyd (1939) has tabulated the results of a number of A-B-O surveys in India, but no M-N investigations appear

to have been made prior to that time. Subsequently, several Rh and M-N surveys have been made on Indians, the reports of which have been cited by Prasad, Ikin and Mourant (1949).

The findings of the work done on Indians may be briefly summarized as follows.

The A-B-O gene frequencies averaged over a large number of separate investigations would be close to $p = 0.185$, $q = 0.260$ and $r = 0.555$. The presence of subgroup A₂ has been demonstrated in several of the more recent surveys.

A high frequency of m has been shown, varying from 0.61 to 0.76. The M-N-S distribution in 95 Indian students tested by Prasad *et alii* in London was: $ms = 0.312$, $mS = 0.288$, $ns = 0.340$, $nS = 0.060$. Of the 95 samples tested 56 (58.9%) were anti-S positive.

The Rh gene frequencies determined by the same investigators in 105 Indian students were: $R^1 = 0.566$, $R^2 = 0.104$, $r = 0.247$, $R^0 = 0.042$ and $r' = 0.038$. These frequencies are very similar to those obtained by Wiener, Sonn and Belkin (1945) in 156 Moslems tested in New York. The people of India differ from most coloured races in having the subgroup A₂ and also from 2% to 10% Rh-negative individuals in the population. The highest Rh-negative percentage was found in the north of India, and the lowest in the south. Of nine anti-Rh₀ (anti-D) negative blood samples found in Prasad's series, none showed the presence of the D⁺ variant. Tests for the C⁺ variant have not been performed.

As far as we know, data are lacking for Indians relative to the blood groups P, Duffy, Kell and Lewis, and also for A, B or H salivary secretion, and ability to taste phenyl thiocarbamide.

As nothing was known about the various gene frequencies for any of the numerous and mostly inaccessible aboriginal tribes in India, the opportunity was welcomed when it arose to test the Chenchu. Such tribes representing the older racial elements in India should provide the most useful information concerning India's racial prehistory. They have the further advantage of being casteless, and hence the complexities of Indian social stratification are avoided (Birdsell, 1952). The gene frequencies of such tribes as the Chenchu are naturally of importance in investigating racial elements of south-eastern Asia and the Pacific, in which our chief interest lies.

THE CHENCHU.

The following notes of a general nature on the Chenchu were kindly prepared for us by the Rev. J. Sathianathan, of Vellore, India.

General Comments.

To trace the anthropology of the Chenchu it is necessary to go back to a prehistoric period. In dealing with prehistoric man it should be remembered that his numbers were limited, and that survival must have been difficult. The very sparing evidence of palaeolithic implements found in south India confirms the belief that men of this age were few and far between. The only trace of cave-men so far discovered in India is in the Kurnool district at Billa Sargam, a few miles north of Medarapalle. The descendants of these prehistoric men live in various parts of south India. It seems likely that south India is one of the places where *Homo sapiens* made his first appearance. The neolithic settlements were determined by the availability of the trap rock suitable for making polished weapons and implements. The principal sites of neolithic culture are found in the Salem, Cuddapah, Anantapur, Bellary and Kurnool districts of Madras. The following castes and tribes are considered to be descended from neolithic man: Yanadis, Irulas, Malakudias, Kudubis, Kadirs or Karans, Koudhs, Cherumis, Holayas and Chenchu.

The language of the Chenchu inhabiting Kurnool and Nellore is a dialect of the Khonda language together with a few Karnataka and Telugu words. It seems to be a corrupt form of Hindi and Urdu. In a census report of 1891, Chenchu is given as a subdivision of the Yanadis. The Chenchu today say that they and the Yanadis are one and the same, and that the tribes intermarry.

It has been said that they live to the westward of Ahobalam, Srisaillam and other places in the woods or wilds, go about constantly carrying bows and arrows, and clothe themselves in leaves. They rob travellers, killing them if they oppose. They afflict every living creature. In recent accounts furnished by the Forest Officer of Nallamal Hills it is noted that pilgrims to the Srisaillam temple were exploited at every turn by the Chenchu. In return for protection the Chenchu levy a toll per head. They also levy blackmail from the graziers in the hills.

Some Chenchu are semi-civilized, wear clothes, possess flocks and cultivate fields and gardens, while others—for example, the Bairnuthi Chenchu living in the forest of Pacharla—present very different conditions of life. They accentuate their nakedness by a narrow bark thread bound round the waist into which are thrust their arrows and knife.

The Chenchu are not considered to be remarkably expert as archers. To the Chenchu, a feast, on however liberal a scale the food may be, is nothing without a copious supply of toddy, of which even the infants receive a small share.

Some Chenchu wear on the head a cap made of wax-cloth, deer or hareskin. The fashionable often wear the bushy tail-end of the large Indian squirrel by way of ornament attached to the string with which the hair of their head is tied. Leafy garments have been replaced by white loin-cloths, and some of the women have adopted the "ravikal" (bodice) in imitation of the female costume

in the plains. Boys, girls and women wear bracelets made of palm leaves. Some pieces of stick strung on a thread are worn as a charm to ward off various forms of pain. Some of the women are tattooed on the forehead, corners of the eyes and arms. Some men are tattooed on the shoulder as a cure for rheumatism.

The staple food of the Chenchu consists of sago, rice and the young shoots of the bamboo, supplemented by tubers and roots, which are dug with a digging stick tipped with iron; also forest fruits, bear, black monkey, lizard and peacock. They are very fond of the young flowers and buds of the mahua tree and tamarind fruits, the acid of which is removed by mixing the fruit with ashes of the bark of the same tree. They gather honey from bees in the trees or rocks. It is recorded in the Cuddapah Manual¹ that only Yanadis or Chenchu are able to climb miraculously into difficult and apparently inaccessible places, and over a perpendicular cliff in some places from a hundred to two hundred feet high. They climb by means of a plaited rope made from young bamboo.

The Chenchu, like the Andhras, have exogamous septs (totem clans), of which the following are examples: Gurram (horse), Arati (plantain tree), Manu (trees), Tota (garden), Mekhala (goats), Indla (houses).

Social Customs.

Marriage.

The Chenchu do not follow a uniform custom in respect to marriage ceremonies. Their marriage may be performed in three ways. A man wishing to marry selects his own bride, and both retire by mutual consent for one night from the settlement. On the following morning when they return their parents invite their friends and relatives and by formally investing the couple with new clothes declare them married.

In the second way a small circular space is cleared and besmeared with cow-dung. In the centre a bow and arrow tied together are fixed in the ground, and the bride and bridegroom are made to move round it. The men assembled bless them by throwing rice over them, and this completes the marriage. The importance of the arrow with the Chenchu as with the Yanadis is that the moment when it casts no shadow is the auspicious time for the completion of the marriage rite.

In the third form of marriage ceremony a Brahmin is consulted by the elders of the family. An auspicious day is fixed, and a raised platform is made on which the bride and bridegroom are seated. A "tali" (marriage badge) is tied to the bride by the bridegroom, and rice is poured over their heads. The services of the Brahmins are engaged for three or four days, and they are rewarded with a piece of new cloth and some money. This ceremony resembles that of the Ryot class among the Hindus and is evidently a recent Brahminical innovation, according to the Kurnool Manual.

The remarriage of widows is permitted, and the second husband is in most cases a brother of the deceased. Both men and women join in folk dances, and they execute a series of step-dances in tune with a drum.

Birth of a Child.

When a child is born the umbilical cord is cut with a knife or an arrow, and the child is then washed with hot or cold water, depending on the season. On the third day after the birth all the women of the tribe are invited and served with betel nut. On the fourth day an old woman gives a name to the child. The baby is generally laid in a cradle made of deer skin, which is suspended from a bamboo by means of strings, or "dusara" creepers.

Disposal of the Dead.

The dead are carried to the burial place in a cloth slung on a pole. The body after it has been laid in the grave

¹ Much of the data on the Chenchu presented here have been drawn from reports in the Cuddapah and Kurnool Manuals, copies of which are preserved in the Collector's Office of the District and in the Secretariat of Madras. Access to this information is gratefully acknowledged.

is covered over with leafy twigs, and the grave is filled in. The spot is marked by a mound of earth and stones. On the second or third day some cooked food is offered at the grave for the soul of the deceased. After some of it has been set apart for the fowls of the air (crows) the remainder is buried in the mound. The same rite is repeated after the eighth day.

Religion.

The Chenchu, like the Yanadis, worship a god called Chenchu Devatha, to whom offerings of honey and fruit are sometimes made. They believe that a god whom they call Obalesudu carried off a beautiful Chenchu girl named Chenchita and married her. To prevent the occurrence of a similar fate to the other females of the tribe, Chenchita decided that they should in future be born ugly and devoid of personal charms. The Chenchu claim Obalesudu as their brother-in-law, and they go to the temple for the annual festival with clothes as presents for the god and goddess.

Education.

In 1904-1905 the Government, wishing to improve the status of the Chenchu, opened two schools for the children. These children were fed, clothed and provided with books, and as a result a number are now employed in the public services. It is the desire of the Government of India to provide facilities for these people for higher education, so that they may enjoy with others equal status as citizens of India.

THE PHYSICAL ANTHROPOLOGY OF THE CHENCHU.

The Chenchu occupy mainly the Nalaimallais hill region in the Kurnool and Guntur districts of the Madras Presidency, but are also found across the Krishna River in the hills of the Mahbubnagar district of Hyderabad in Central Peninsular India. According to Guha (1935), the total population of the Chenchu was 8078. Nearly half of these live in the Kurnool district, about one-fourth in the Guntur district, and the remainder in Hyderabad. Guha states that owing to close contact with neighbouring people of the plains, the Chenchu of the Kurnool and Guntur districts are being rapidly assimilated among the lower classes of the Hindu population, although intermarriage does not openly take place. However, Thurston (1909) quotes several instances of mixed marriages between Chenchu and neighbouring peoples. In one such case a Chenchu girl married out of her tribe. In another instance a Bôya man married into the Chenchu tribe and lived with them. Thus there are suggestions that the Chenchu are both disappearing through assimilation among neighbouring Hindu groups and also, to some degree, becoming attenuated through marriages of non-Chenchu peoples into the tribe. The rate of gene flow which must be considered to operate in both directions reciprocally has probably been under-estimated owing to the lack of detailed field work among these people, and it has no doubt increased with the passage of time.

In Hyderabad the Chenchu remained in complete isolation until about 1900. At that time a track was cut through the forests over the hills giving access to the region they inhabit. It must be presumed that the latter Chenchu have been less influenced by hybridization than those of Kurnool and Guntur.

Thurston (1909) identifies the Chenchu as a Telugu-speaking jungle tribe. He notes that the Chenchu and the Yanadis intermarry and are descended from the same original stock. According to Ghulam Ahmed Khan (1935), the Chenchu of Hyderabad live on the plateau of the Nalaimallais hill region at an altitude ranging from 2500 to 3000 feet. The region is densely forested. The Chenchu are divided into exogamous septs, which function to regulate marriage. He states that there are five septs, whereas Thurston lists eight. It is not certain that even the figure of eight represents a complete count. Khan states that cross-cousin marriages are the norm, but does not indicate whether this is a true biological cross-cousin marriage or whether, as is more likely, it represents classificatory cross-cousin marriage.

With regard to their physical characteristics, Thurston states (page 43): "Some Chenchus still exhibit the primitive short stature and high nasal index which are charac-

teristic of other jungle tribes such as the Kādīrs, Paniyans and Kurumbas. But there is a very conspicuous want of uniformity in their physical characteristics, and many individuals are to be met with above middle height or tall, and with very narrow noses." Guha identifies a long and moderately high-headed strain of short stature with often strongly marked brow ridges, a broad short face, the mouth slightly inclined forwards and a small flat nose with the alae extended. The hair varies from wavy to curly and the skin colour is a shade of dark chocolate brown approaching black. This type is predominant among the aborigines of central and south India, and also seems to have entered to a considerable degree into the lower stratum of the Indian population. This type is closely allied to the Veddas of Ceylon, the Toala of Celebes and the Sakais of the Malay Peninsula. A more primitive form of this type is often seen among the aborigines of Australia, in whom some of the traits are found in an intensified form. The Bhils of the Vindhya and the Chenchu of the Faharabad Hills may be regarded as representative of this type. It seems probable that at a very early time this type displaced and partially intermixed with a dark pygmy strain having spirally-curled hair. Remnants of the latter type are still found among the Kādīrs and the Pulayans of the Perambicullian Hills, but it is mostly submerged in India at the present time. Guha measured 23 males from the interior of the hills at Faharabad. They show the following metrical characteristics (from Guha's Table V) (all figures are in millimetres): Stature, 1649-52; maximum head length, 185-17; maximum head breadth, 134-83; auricular head height, 120-48; minimum frontal, 100-83; maximum bizygomatic diameter, 129-00; bigonial diameter, 93-39; total facial height, 110-00; upper facial height, 61-35; nasal length, 48-22; nasal breadth, 39-98. Indices were as follows: cephalic, 70-89; height-length, 65-11; height-breadth, 89-46; frontal parietal, 74-85; cephalo-facial, 95-75; total facial, 85-26; upper facial, 47-56; nasal index, 81-38.

Morphologically, Guha notes that skin colour varied from tawny brown to dark chocolate brown (numbers 23 to 33 on the von Luschan scale). Hair colour was generally black. Hair form was straight in 13%, wavy in 79%, curly in 8%. No frizzy or woolly hair was observed. Hair was scanty in quantity on the face, and very little showed on the body. Brow-ridge size was well marked, with 4% classed as very prominent. Prognathism was slight in most individuals, but quite marked in 9%.

The Chenchu in appearance are more reminiscent than any other population in Asia of the Carpentarian component in Australian aborigines. The above abridged morphological description tends to confirm this. Their indicial values correspond closely to those for Carpentarian populations (Birdsell, 1951), save that the nasal index is considerably reduced among the Chenchu. Metrical measurements of the Chenchu deviate rather widely from those of the Carpentarians. In general, the cranial and facial diameters are much smaller among the Chenchu. It seems true that all the populations of India which might be adduced for comparison with the Carpentarians are marked by this reduction of value in their measurements; these differences, however, need not be considered as denials of ultimate genetic relationship between the two groups (Birdsell, 1952).

The reader is also referred to a monograph dealing with the Chenchu by Fürer-Haimendorf (1943), who worked amongst the Chenchu of the Amrabad Plateau, an extension of the Nallamalai Hills. This author describes the Chenchu as the most northerly group of "Malids", a term used to denote the most primitive hill races of south India. He states that the Chenchu of Madras, south of the Krishna River, are in close and constant contact with those of Hyderabad. According to him, the Chenchu do not appear racially homogenous, even in isolated forest groups, and he observes that Guha's series came from villages near the cart track, where mixture with outsiders was more prevalent than among those studied by himself. In the 1941 census there were in Madras Presidency 9003 Chenchu, of whom 5878 lived in the Kurnool district and 2104 in Guntur. In former times the Chenchu of Madras, like

those of Hyderabad, lived scattered over the hills in small groups and subsisted on game and fruits of the forest, but through government compulsion they have now been gathered together into larger villages. The Chenchu of Kurnool are more prosperous than those of Hyderabad and tend to look down on them; but, even so, they have no prejudice against intermarriage. Fürer-Haimendorf cites an A-B-O grouping of 100 Chenchu, in which 37% were found to be group O, 37% group A, 18% group B and 8% group AB.

MATERIALS AND METHODS.

The field expedition covering twelve days was made in October, 1951. One of us (G.W.L.D'S.) with two technicians travelled from Vellore to Marcherla in the Guntur district, where a base was established. Many difficulties were encountered both in locating and in contacting the Chenchu before they disappeared into the jungle. Often places were visited where Chenchu were said to live, but none were found. In the Guntur district 28 blood samples were collected in the locality of Veludurti from nearby villages. A further 46 samples were collected at the villages of Subbareddipalem and Nagulavaram in a locality about 12 miles from Veludurti. The search was then continued in the Kurnool district via Vinukonda, Markapur, Dornala and thence to Chintala, where 30 samples were obtained. Another lot of 28 samples was obtained at Peddachama, a village about five miles from Chintala. The direct distance from the Veludurti area in Guntur to the Chintala area in Kurnool is about 40 miles. In all, only 132 samples were obtained, and of these 24 were lost owing to hæmolysis on storage and during transit to Melbourne. This number was most disappointing, especially in view of the effort expended.

The individuals sampled represented the breeding population, and all but 12 of the 132 were over twenty-one years of age. The 12 exceptions were aged from eighteen to twenty years. The limited data obtained on family relationships showed that each local group consisted of members very closely related, especially those tested in the Guntur district.

The methods used in collecting the samples in the field and in testing in the laboratory in Melbourne have been described by Simmons, Graydon Semple and Taylor (1951), Simmons (1949), Simmons and Graydon (1950), and Simmons, Semple and Graydon (1951).

RESULTS AND DISCUSSION.

The A-B-O Frequencies.

The A-B-O gene frequencies are presented in Table I for 53 Chenchu of Guntur and 55 of Kurnool. The respective frequencies were: $p = 0.233$, $q = 0.281$, $r = 0.532$; $p = 0.211$, $q = 0.270$, $r = 0.539$.

The combined frequencies for 108 individuals were: $p = 0.222$, $q = 0.275$, $r = 0.536$.

The results obtained in each district were similar, and do not differ greatly from those of Wiener *et alii* (1945) for 156 Indians tested in New York, in which $p = 0.185$, $q = 0.261$, $r = 0.583$.

Of 37 individuals of groups A and AB all except one were of subgroup A₁ and A₂B. The one exception found was of subgroup A₂B.

The M-N-S Frequencies.

The M-N-S frequencies are shown in Table II. In 53 Chenchu of Guntur, $m = 0.660$, $n = 0.340$; while in 55 Chenchu of Kurnool, $m = 0.427$, $n = 0.573$. Prasad *et alii* (1949) in their tests on 95 Indian students found $m = 0.619$, $n = 0.381$. Thus, the frequencies of m and n for Chenchu of Guntur and Indian students are similar, but the Chenchu of Kurnool show a lower m and higher n frequency. The combined frequencies for 108 Chenchu were $m = 0.542$ and $n = 0.458$. This m frequency is therefore lower than that found in three surveys in India, where m varied from 0.61 to 0.76.

The S distribution for 108 Chenchu gave the following chromosomal frequencies: $ms = 0.326$, $mS = 0.216$, $ns = 0.248$, $nS = 0.210$.

In the Chenchu 73 out of 108 (67.6%) were anti-S positive. Prasad's frequencies for 95 Indian students, of which 56 out of 95 (58.9%) were anti-S positive, were: $ms = 0.312$, $mS = 0.288$, $ns = 0.340$, $nS = 0.060$.

The S distribution therefore shows a degree of similarity in two populations in India, but in Chenchu nS is higher. The Indian frequencies for the 95 students from Bengal, Bilhar and Bombay are very like those found in English and white Australians, and are therefore Caucasian in type. The S distribution in native peoples is very variable, as is shown in a table prepared by Graydon *et alii* (1952).

No M or N variants were detected in the 108 Chenchu blood samples tested.

The Rh Frequencies.

The Rh gene frequencies calculated from the figures shown in Table III are: $R^1 = 0.692$; $R^2 = 0.073$; $r' = 0.163$; $r = 0.072$.

It was necessary to assume the presence of only four genes, R^1 , R^2 , r' and r , to account for the phenotypes found. Other genes may occur infrequently in Chenchu, but they have not been revealed in the present series.

The Rh types found in Guntur and Kurnool were similar, except that in Guntur six out of 53 (12%) were of type rh' , and this type was not detected in the Kurnool samples.

Of the six rh' individuals, three of type $rh'rh'$ were found in the first lot of 28 samples collected in villages near Veludurti. All three bore the same surname and were males aged fifty, twenty-eight and twenty-five years. Six other individuals in the same group tested bore the identical surname and, in some instances, the same given names. Although family relationships were stated for many of the subjects tested, our lists did not show the actual relationship of the three rh' persons, but they were certainly members of a related group living in one locality.

The three individuals of type $rh'rh$ were found in the villages of Subbareddipalem and Nagulavaram in a locality about 12 miles from Veludurti. They occurred in the second batch of samples collected. Two were females, aged twenty-five and thirty years respectively, and one was a male, aged twenty-five years. They possessed different names. Our field data did not indicate a relationship between the three individuals, but all three were living in one locality.

Extensive tests performed on the six anti-Rh₀ (D) negative blood samples with many potent and pure anti-Rh₀ agglutinating sera failed to show any evidence of the presence of Stratton's D^a variant. Prasad, Ikin and Maurant (1949) also failed to detect any evidence of the D^a variant in the anti-Rh₀ (D) negative samples found in 95 Indian students. Nine of 10 such samples classified as $rh'rh$ and $rh'rh$ were tested. It would appear that D^a must be absent or rare in Chenchu and Indians. The agglutination reactions obtained in three samples with anti- hr' (anti-c) serum revealed unequivocally the presence of the gene r , although no Rh-negative (rr) sample was found in the 108 samples tested.

No example of the rh'' (C⁺) variant was found in 108 blood samples tested.

The Lewis Blood Group and Salivary Secretion.

None of 49 blood samples from Guntur reacted with anti-Le^a serum, whereas nine out of 49 (18%) from Kurnool were Le(a+). The difference is statistically significant and supports the evidence already provided by the M, N and Rh tests that our samples from Guntur and Kurnool are not representative of one homogeneous Chenchu group. Whether these differences have arisen through the inclusion of closely related persons in small groups, or whether it is indicative of a real racial difference between the Guntur and Kurnool Chenchu is not known, but the similarity of the average frequencies to those of other Indian groups would favour the former as the likely explanation. The combined figures were nine out of 98 (9.2%) Le(a+).

TABLE I.
The A-B-O Blood Groups and Gene Frequencies in Chenchu.

District.	Number of Blood Samples Tested.	Locality or Village of Collection.	Blood Groups.					Gene Frequencies.		
			O	A ₁	B	A ₁ B	A ₂ B	p	q	r
Guntur ..	53	Veludurti (locality), Subbareddipalem, Nagulavaram	15 (28%)	16 (30%)	20 (38%)	1 (2%)	1 (2%)	0.233	0.281	0.532
Kurnool ..	55	Chintala, Peddachama ..	16 (29%)	15 (27%)	20 (36%)	4 (7%)	0	0.211	0.270	0.539
Totals ..	108		31 (28.7%)	31 (28.7%)	40 (37.0%)	5 (4.6%)	1 (0.9%)	0.222	0.275	0.536

TABLE II.
The M-N Types, S Distribution and Gene Frequencies.

District.	Number of Blood Samples Tested.	M-N Types.			Frequency of Genes.		Proportion of Samples S-Positive.	Distribution of S-Positive Samples.		
		M	MN	N	m	n		M	MN	N
Guntur ..	53	22 (42%)	26 (49%)	5 (9%)	0.660	0.340	40/53 (75%)	16/22	20/26	4/5
Kurnool ..	55	11 (20%)	25 (45%)	19 (35%)	0.427	0.573	33/55 (60%)	5/11	15/25	13/19
Totals ..	108	33 (30.6%)	51 (47.2%)	24 (22.2%)	0.542	0.458	73/108 (67.6%)	21/33 (63.6%)	35/51 (68.6%)	17/24 (70.8%)

Approximate chromosomal frequencies calculated from the figures in the present survey are as follows: $ms=0.326$; $mS=0.216$; $ns=0.248$; $nS=0.210$.

TABLE III.
The Rh Types and Gene Frequencies.

District.	Number of Blood Samples Tested.	Rh Types.						
		Rh ₁ Rh ₁	Rh ₁ rh	Rh ₂ Rh ₂	Rh ₂ rh	Rh ₁ Rh ₂	rh'rh'	rh'rh
Guntur ..	53	34 (64%)	6 (11%)	1 (2%)	0	6 (11%)	3 (6%)	3 (6%)
Kurnool ..	55	42 (76%)	5 (9%)	0	1 (2%)	7 (13%)	0	0
Totals ..	108	76 (70%)	11 (10%)	1 (1%)	1 (1%)	13 (12%)	3 (3%)	3 (3%)

Gene frequencies: $R^1=0.692$; $R^2=0.073$; $r'=0.163$; $r=0.072$.

TABLE IV.
Blood Group Gene Frequencies.

Population.	Number Tested.	A-B-O			M-N		M-N-S				Rh				
		p	q	r	m	n	ms	mS	ns	nS	R ⁰	R ¹	R ²	r	r'
Indians: Prasad <i>et alii</i> , 1949 Wiener <i>et alii</i> , 1945	95-105 156	— 0.185	— 0.261	— 0.583	0.619 0.622	0.381 0.378	0.312 —	0.288 —	0.340 —	0.06 —	0.042 0.034	0.566 0.562	0.104 0.060	0.247 0.266	0.038 0.044
Chenchu: Present survey ..	108	0.222	0.275	0.536	0.542	0.458	0.326	0.216	0.248	0.210	0	0.692	0.073	0.072	0.163

A total of 48 saliva samples were tested for A, B or H secretion, and of these 45 (93.8%) were secretors (S) and three (6.2%) were non-secretors (ss). In 32 corresponding blood and saliva samples tested there was correlation in 30 between the Lewis blood type and salivary secretion. The two exceptions were Le(a-), ss and were in the Guntur district.

The Blood Group P.

In the Guntur samples 35 out of 46 (76%) and in the Kurnool samples 35 out of 49 (71%) were classed as P positive. The combined figures were 70 out of 95 (74%) P positive. Of the reactions recorded from readings made at 5° C., 57 were classed as P positive, 13 as weak P positive, and 25 as P negative.

The Duffy (Fy^a) Blood Group.

Indirect Coombs tests were performed on 10 random samples from Guntur and 14 from Kurnool. Duffy positive reactions were obtained in 24 out of 24 (100%). Only limited Duffy and Kell tests were performed, in order to conserve the supplies of testing sera which had generously been sent to us by Dr. A. S. Wiener of New York.

The Kell (K) Blood Group.

Indirect Coombs tests were performed on the same random samples as were used for the Duffy tests. In the Guntur samples two out of 10, and in the Kurnool samples one out of 14 were Kell positive. The combined figures were three out of 24 Kell positive. These reactions were thought to be reliable.

Ability to Taste Phenyl Thiocarbamide.

Tests of ability to taste phenyl thiocarbamide were performed on 132 Chenchu. A total of 82 (62.1%) were recorded as tasters, and of these 79 were classed as tasters and three as weak tasters. The remaining 50 (37.9%) appeared to lack the ability to distinguish between the test and control papers. The field workers assisted by interpreters regarded the results recorded as fairly reliable.

The Chenchu in Relation to Australian Aborigines.

It has been suggested on physical grounds that Australian aborigines and some peoples of south India possess a common racial component. In a paper dealing with the Ainu of Hokkaido, Northern Japan, Simmons, Graydon, Semple and Kodama (in the press) discuss their Ainu genetic findings in relation to a possible prehistoric blood link between Ainu, Australian aborigines and American Indians.

Australian aborigines and Chenchu possess in common a significant frequency of the blood factor rh', which is also possessed by the Caucasoid race, but is lacking in other coloured races tested to date except Asian Indians. The presence of rh' in easily demonstrable quantities in Chenchu, in other Asian Indians, in Australian aborigines (Simmons and Graydon, 1948), and to a lesser degree in Caucasians, may be interpreted as evidence that they possess a common racial component, as has been suggested by some anthropologists on other grounds. If this be so, it may be inferred that the characters which are absent from one or more of these racial groups must also have been lacking in the common component unless random genetic drift has been responsible for the disappearance of some of the relevant genes. The following genes, which are not of equal importance anthropologically owing to their different frequencies in various races, would be absent or present in very low frequency in the hypothetical common component: *q*, *p*, *r*, *r'*, *C^w*, *Fy^a*, *mS*, *nS*, *R²* and *r²*.

The Chenchu in Relation to Indians.

The A-B-O frequencies shown in Table IV for Chenchu and Indians are very similar. In Chenchu, one individual in 37 of groups A or AB was shown to possess subgroup A₂, but in Indians subgroup A₂ is relatively more common. The presence of A₂ in Chenchu may possibly be due to recent Indian admixture.

The M-N frequencies for Chenchu of the Guntur district and Indians are very similar, but the Chenchu of the

Kurnool district show a much lower *m* and a higher *n* frequency than Indians (Tables II and IV).

There is a resemblance between the S frequencies in Chenchu and Indians, but they are not like those found in any other coloured peoples tested to date. In Chenchu, however, the frequency for *nS* is 0.21, compared with 0.06 in Indian students. In Chenchu 67.6% were anti-S positive, and in Indians the percentage was 58.9.

Both Chenchu and Indians show a high percentage of type Rh₁. The Chenchu percentage is 80 compared with 70 for Indians. Type Rh₂ is infrequent in each group; type rh' occurs in each population, but seems to be more frequent in Chenchu. Type rh occurs in 2% to 10% of Indians tested, but was not demonstrated in Chenchu in the present survey. The gene *r* was, however, shown to be present unequivocally in association with gene *r'*. Type Rh₂ occurs in Indians, but was not found in our Chenchu series.

The Rh gene frequencies calculated for Indians and Chenchu are shown in Table IV. The Indians, compared with Chenchu, have gene *R²*, which is absent or in low frequency in the latter; the gene *R¹* frequency is a little lower in Indians, and gene *R²* frequency is about the same in each group. The *r* frequency is much higher in Indians, and gene *r'* frequency is higher in Chenchu. It may be said that the general picture of gene frequencies covering the A-B-O, M-N-S and Rh groups suggests that the two populations are indeed closely related. The above comparisons have been made on three blood group systems only, owing to the present lack of data for Indians covering other blood factors. Many of the Chenchu tested were related members of the breeding population in village groups, as it was not possible to collect unrelated Chenchu samples owing to the many difficulties encountered in the field.

It is evident that the Chenchu and other Indians have many genes and gene frequencies similar to those of white Caucasians. For example, there are the presence of subgroup A₂, the higher frequency of *m* than *n*, an almost identical percentage of reactors with anti-S, and much similarity in the distribution of S, as well as the presence of Rh genes *r* and *r'*, all of which strongly suggests that at least one major racial component is common to the peoples of India and Caucasians. No Pacific race possesses a similar array of blood characters. On the basis of blood genetics alone the relationship between the Indians and the whites appears to be much closer than that between the Indians and any other race; although one might suspect also a slender relationship with the Australian aborigines, which is in agreement with the conclusions of the physical anthropologist.

When it is possible to use for comparisons the gene frequencies for all the important blood group systems, the rather tangled paths of racial origins may eventually be cleared. It is felt that real progress is being made, but the combined efforts of many investigators over a number of years will be needed.

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SUMMARY.

1. Blood samples from 108 Chenchu have been tested for the A-B-O groups and subgroups of A, the M-N-S types, the Rh types and variants, the Lewis (Le^a) blood group and its correlation with A-B or H salivary secretion, and the P, Duffy and Kell blood groups. Phenyl thiocarbamide (P.T.C.) taste tests were also performed on the same subjects.

2. The A-B-O group percentages in 108 Chenchu were as follows: group O, 28.7; group A₁, 28.7; group B, 37.0; group A₂B, 4.6; and group A₂B, 0.9. The corresponding gene frequencies are: $p = 0.222$, $q = 0.275$, $r = 0.536$. Of 37 group A and AB samples tested, 36 were of subgroups A₁ or A₂B and one was of subgroup A₂B.

3. The M-N type percentages in 108 Chenchu were: type M, 30.6; type MN, 47.2; type N, 22.2. The corresponding gene frequencies are: $m = 0.542$, $n = 0.458$. No M or N variants were detected. In the S subdivision of M-N, 73 out of 108 (67.6%) were anti-S positive. The gene frequencies are: $ms = 0.326$, $mS = 0.216$, $ns = 0.248$, $nS = 0.210$.

4. The Rh types in 108 Chenchu were: Rh₁Rh₂, 70%; Rh₁rh, 10%; Rh₂Rh₂, 1%; Rh₂rh, 1%; Rh₁Rh₂, 12%; rh'rh', 3%; rh'rh, 3%. The corresponding gene frequencies are: $R^1 = 0.692$, $R^2 = 0.073$, $r^1 = 0.163$, $r^2 = 0.072$. No rh^w (C^w) or Rh₃ (D^a) variants were detected.

5. Of 98 samples tested with anti-Le^a serum, nine (9.2%) were Le(a+). Of 48 saliva samples tested for A, B or H substances, 45 (93.8%) were secretors (S), and three (6.2%) were non-secretors (ss). There was good correlation between the Lewis blood type and salivary secretion.

6. In tests for the blood group P, 70 out of 95 (74%) were regarded as P positive.

7. Of 24 random blood samples tested for the blood group Duffy (Fy^a), 24 out of 24 (100%) were Fy(a+).

8. Tests were performed on the same 24 samples for the blood group Kell (K) and of these three out of 24 were Kell positive.

9. In phenyl thiocarbamide (P.T.C.) taste tests performed on 132 Chenchu, 82 (62.1%) were tasters and 50 (37.9%) were non-tasters.

10. The M-N, Rh and Lewis tests reveal differences in gene frequencies which may possibly be accounted for by the inclusion of family groups within the series sampled.

11. The results have been discussed in relation to those published for Indians, Caucasians and Australian aborigines.

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CANCER OF THE UTERUS: THE WERTHEIM OPERATION.

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CANCER OF THE CERVIX UTERI.

PRIOR to November 16, 1898, the day on which Wertheim performed his first radical hysterectomy with removal of the lymphatic glands, all women suffering from cancer of the neck of the womb were doomed to die.

Certainly the operation itself was attended by a high mortality in its early days, mostly owing to the then dreadful complication of peritonitis, and to the fact that it was a difficult technical procedure attempted by too many unskilled surgeons. However, it was the first and only hope to be offered these pathetic cancer sufferers, and in expert hands the immediate mortality has been slowly but consistently reduced, as is shown in Table I.

TABLE I.

Operator.	Proportion of Patients Fit for Operation.	Primary Mortality Rate.
Wertheim (his first 500 cases)	49.0%	19.0%
Wertheim (his second 500 cases) ..	48.0%	13.0%
Second Vienna University Women's Clinic (Kernauer, Weibel, 1924-1936) ..	55.3%	8.3%
G. A. Wagner (Berlin <i>Charité</i> , 1928-1943) ..	41.1%	14.8%
Antoine (Vienna, Lainz, 1937-1940) ..	42.85%	4.34%
First Vienna University Women's Clinic (Schauta, Peham, 1901-1934) ..	54.7%	6.6%
Stoeckel (Berlin, University Women's Clinic, 1933-1937) ..	30.0%	6.2%
Amreich (Innsbruck, 1936-1939)	41.7%	8.0%
Amreich (Vienna, First University Women's Clinic, 1939-1943)	73.9%	14.6%
Werner (Vienna, Rudolf Foundation, 1939-1940)	78.58%	7.96%
Werner (Vienna, Lainz, 1940-1950) ..	76.35%	6.0%
Bonney (his first 500 cases)	63.0%	14.0%
Royal Prince Alfred Hospital, Sydney, 1930-1951 (635 cases)	51.4%	3.9%

Later, many surgeons turned to the Schauta operation by the vaginal route to extirpate the uterus and the appendages. It was held that the procedure had a lower immediate mortality, but it was soon pointed out that a thorough removal of the lymphatic glands was extremely

TABLE II.
Schauta's Operation.

Workers.	Operability Rate.	Primary Mortality Rate.
Peham and Amreich	50.0%	6.0-7.0%
Amreich (Innsbruck, 1936-1939)	41.7%	8.0%
Amreich, Vienna (1939-1943)	73.9%	14.6%

difficult or impossible by this route and that 20% of patients (that is, the average number with gland involvement at operation) were precluded from a five or ten year absolute cure.

We learn some facts regarding the Schauta radical operation from Peham and Amreich (Table II).

The advent of radiotherapy in the attack on cancer of the cervix is related in a recent publication (1952) by

Professor P. Werner and Dr. J. Sederl. The former was Wertheim's last pupil. He writes that at the German congress of gynaecologists at Halle on Saale (Whitsun, 1913), E. Wertheim intended to deliver a comprehensive report on his operation for carcinoma of the neck of the womb, dealing with cases that had been accepted in his institute from October, 1909. Earlier successes had been published in his standard work "Extended Abdominal Operation of Carcinoma of the Neck of the Womb" in 1911.

It was at the Halle Congress that, for the first time, extensive reports were presented on successful cures with mesothorium and radium, all of which conveyed excellent results. On that occasion A. Döderlein approached Wertheim, tapped his shoulder and said: "My dear Wertheim, you are a historical personality, your operation will not be made any longer."

Impressed by the reports on successful treatment with radium and mesothorium only one to three years previously, not the standard five years, and by Döderlein's words, Wertheim cancelled his announced lecture on that occasion.

TABLE III.

Institution.	Reports Start in Year.	Total Number of Patients Treated.		Alive with No Evidence of the Disease.	
		Five Years.	Ten Years.	Five Years.	Ten Years.
Manchester ..	1933	3004	1379	977 (32.5%)	292 (21.1%)
Royal Prince Alfred Hospital, Sydney	1930	600	391	206 (34.3%)	111 (28.4%)

At the clinical congress of the American College of Surgeons in New York in October, 1938, Werner gave a lecture on Wertheim's operation for carcinoma. There was little interest, and after the lecture some colleagues with whom he was on friendly terms told him that, with few exceptions, operations for carcinoma were no longer performed in America, as all patients were now treated with irradiation.

When in the spring of 1950 Werner accepted an invitation to undertake a lecture tour around the gynaecological centres of South America, he faced an entirely different situation. Although the purpose of his tour had been to demonstrate the methods of operation on the vagina, he was nevertheless requested everywhere to present and discuss Wertheim's operation. Interest in this operation was greater than had been expected.

My own experiences abroad in 1951 would confirm this experience of Professor Werner. After visiting many cancer clinics in Britain, the United States and the Continent of Europe, and especially after listening to the discussions on *cancer du col* at the Paris Jubilee Congress of French gynaecologists in June, 1951, I came home with the impression that the medical world, disappointed in its sanguine expectations from irradiation therapy, was turning back to radical surgery, slowly but surely. Everywhere gynaecologists were eager to discuss the Wertheim procedure and to learn of the results achieved.

There are few great operative procedures which could for such a long time maintain their leading position in gynaecology and even become more widely recognized, as has the extended abdominal extirpation of the womb in cases of carcinoma of the neck of the womb, and therefore the operation rightly bears Wertheim's name. Werner protests against the attempt of Joe Meigs, Boston, to change the name of the operation. Meigs states that in his opinion the operation carried out now is more radical than that performed by Wertheim. Werner states that apparently Meigs does not know how radical were the operations carried out by Wertheim, nor does he seem to know that Wertheim on the first occasion exposed the ureters and extirpated the glands. One can verify how

radical Wertheim's operations were by referring to the morbid specimens preserved in the museum of the Second Vienna University Women's Clinic. Werner proffers the opinion that the improvements that have been achieved since then in the way of an absolute permanent five-year cure are not so much due to an extension of the radical character of the operation as they are to earlier diagnosis and to the reduction of primary mortality through the use of blood transfusions, chemotherapy and the help of radioactive substances.

TABLE IV.
Comparative Results of Absolute Cure (Five Years).

Operator.	Prevailing Type of Operation.	Absolute Cure Rate.
Wertheim (1898-1916) ..	Wertheim.	18.6%
Second University Women's Clinic, Vienna (Wertheim, Kermauner, 1916-1923) ..	Wertheim.	26.9%
Second University Women's Clinic, Vienna (Kermauner, Welbel, 1924-1936) ..	Wertheim.	36.1%
Antoine (Vienna, Lainz, 1937-1940) ..	Wertheim.	36.6%
First University Women's Clinic, Vienna (Schauta, Peham, 1901-1934) ..	Schauta.	26.0%
Stoeckel (Berlin, University Women's Clinic, 1933-1937) ..	Schauta.	36.5%
Stoeckel (Berlin, University Women's Clinic, 1938) ..	Schauta.	42.1%
Amreich (Innsbruck, 1936-1939) ..	Schauta-Amreich.	36.1%
Amreich (Vienna, First University Women's Clinic, 1939-1943) ..	Schauta-Amreich.	34.1%
Werner (Vienna, Rudolf Foundation, 1934-1940) ..	Wertheim.	46.44%
Werner (Vienna, Lainz, 1940-1945) ..	Wertheim.	48.19%
Bonney (London, first 500 cases) ..	Wertheim.	40.0%
Royal Prince Alfred Hospital (Sydney, 1930-1946) ..	Wertheim.	55.3%

Radiotherapy.

From the Halle on Saale Congress in 1913 onwards radiotherapy took the field and captured the imagination of the medical profession. More and more clinics turned away from surgery, and very few surgeons remained faithful to the principles as taught by Wertheim. In our own Commonwealth and Empire Victor Bonney was possibly the only surgeon who continued with straight surgery to the end, without any reliance on the new agencies. In

TABLE V.

Royal Prince Alfred Hospital, Sydney: Carcinoma Cervicis*Uteri, 1930-1946: Squamous Carcinoma and Adenocarcinoma Combined Figures, Five- and Ten-Year Cure and Survival Rates, Compiled December, 1951.

Observation.	Five Years.	Ten Years.
All patients examined with view to treatment ..	635	407
All patients treated ..	600	391
Alive without recurrence ..	206	111
Alive with recurrence ..	6	1
Dead of carcinoma ..	373	265
Dead of intercurrent disease (under five and ten years) ..	9	10
Lost or not followed up ..	6	4
Cure rate amongst all patients examined ..	32.4%	27.3%
Survival rate amongst all patients examined ..	33.4%	27.5%
Cure rate amongst all patients treated ..	34.3%	28.4%
Survival rate amongst all patients treated ..	35.3%	28.6%

Australia, Foreman and Thring, my old teachers, followed Bonney's example, and my generation was brought up on surgery alone. In 1928 the Commonwealth Government provided all the clinical hospitals in Australia with an ample supply of radium and deep X-ray machines. As one of the old school I always felt doubtful of the penetrative effect of these agencies, although I could not close my eyes to their miraculous local results; but it was not very long before our pathologists found remaining active cancer cells embedded in the deep tissues of our sectioned cervixes, and proved conclusively over and over again that even the largest doses of radiotherapy had no effect on the cancer cells when they had reached the lymphatic glands. They also found that certain types of cancer were

TABLE VI.

Royal Prince Alfred Hospital, Sydney: Carcinoma of Cervix: Five-Year Survival Rates of All Patients Examined, 1930 to 1946 Inclusive.

Treatment.	Stage I.		Stage II.		Stage III.		Stage IV.		Total.	
	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.
Application of radium and surgery	41	30	133	75	110	52	—	—	284	157 (55.3%)
Application of radium alone ..	5	3	46	14	166	30	81	4	298	51 (17.1%)
Application of radium and incomplete surgery	1	1	5	2	8	—	4	1	18	4 (22.2%)
No treatment	—	—	—	—	2	—	33	—	35	—
Total	47	34	184	91	286	82	118	5	635	212 (33.4%)

insensitive to irradiation, and that nothing but radical removal could give the patient a chance of a permanent five or ten year cure. Consequently, with the knowledge that dirty, septic malignant ulcers could be healed or rendered aseptic by radiotherapy, and that one of the greatest worries of the surgeon—namely, peritonitis—could be avoided by operating in a clean field, our school embarked in 1930 on the use of pre-operative radiotherapy followed by radical surgery for the following reasons: (i) The effect of radiotherapy on the tissues could be checked by the pathologists, and so could be of help in determining dosage. (ii) Surgery was the only method of dealing with growths insensitive to irradiation. (iii) The lymphatic glands, upon which the pathologist proved that even the largest doses of radiotherapy had no effect, were removed.

For a short time we experimented with dosages from 2500 to 9000 milligramme-hours of radium in one application and, strange to say, some of the best pathological results followed the lower dosage. We soon settled down to the following routine: we give one application of 7000 milligrammes of radium, prior to operation or to any further treatment by radiotherapy, and thereby differ from the Swedish school, which divides the dosage and does not have recourse to subsequent surgery. Our technique is as follows. Thirty milligrammes of radium with platinum screenage of one millimetre are applied to the full length of the uterus, and two corks or moulds of 20 milligrammes of radium with two millimetres of platinum screen are applied to the lateral fornices; all radium is removed after 100 hours. Thus 7000 milligramme-hours of radium treatment are given. From four to six weeks later Wertheim's radical hysterectomy with removal of the lymph gland areas is performed.

We have performed Wertheim hysterectomies from ten days to a year or more after the radium application, but soon discovered that the optimum time lapse was five to six weeks. During my recent travels in 1951 I found few surgeons who had not adopted some combined form of surgery and radiotherapy, whether the radiotherapy was carried out before or after operation. We in Sydney do

not use deep X-ray therapy in the treatment of our patients submitted to operation. We did for the first few years give X-ray therapy after operation, but we learned that the end results were just as good if we refrained from doing so. Our operability rate in all cases is 51.4%. Patients not suitable for operation are treated by radiotherapy, and we have learnt that its application is not without danger and that there is a definite mortality rate. The reason for the popularity of radiotherapy was the assumption that it had no primary mortality and that also its success was equal and even superior to that of operation. In the meantime a considerable reduction of the original high mortality of the operation has been achieved. Moreover, in the course of time it was found that disaster could occur also with irradiation, especially as through the treatment parametrial inflammation could be lit up and caused to extend to the peritoneal cavity, with following general sepsis and peritonitis. Furthermore, patients were observed with incipient and first-stage growths who could have been easily cured by operation, but in whom nevertheless the carcinoma grew in spite of the irradiation, sometimes even faster than before therapy.

We have always had the impression that the real test of cure by irradiation is found between the fifth and the tenth years. We have noted a great fall in the cure rate curve of patients treated by irradiation alone from the fifth to the tenth year. Figures recorded in the seventh annual report on the results of radiotherapy in carcinoma of the uterine cervix help to confirm our impression. Table III compares our own clinic statistics of cure results by a combination of surgery and pre-operative radium therapy and by radium alone with those of the Manchester clinic, which uses radiotherapy almost exclusively—at any rate, from the published figures it appears that they represent the results from irradiation alone. From these figures it would appear that 7.3% more patients from our clinic than from the Manchester clinic are alive and free from all signs of the disease ten years after treatment was started, owing in our opinion to the use of combined radium therapy and surgery.

TABLE VII.

Royal Prince Alfred Hospital, Sydney: Carcinoma of Cervix: Ten-Year Survival Rates of All Patients Examined, 1930 to 1946 Inclusive.

Treatment.	Stage I.		Stage II.		Stage III.		Stage IV.		Total.	
	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.
Application of radium and surgery ..	32	19	80	41	78	34	—	—	190	94 (49.4%)
Application of radium alone ..	2	1	21	5	110	10	61	2	194	18 (9.3%)
Application of radium and incomplete surgery	—	—	—	—	5	—	2	—	7	—
No treatment	—	—	—	—	1	—	15	—	16	—
Total	34	20	101	46	194	44	78	2	407	112 (27.5%)

There are other clinics, mostly on the Continent, which show a higher ten-year cure from radiotherapy alone; but unfortunately they never record all patients examined, but only the patients treated. This suggests a certain degree of selection, and it logically follows that until all clinics of the world record both examined and treated patients no accurate comparison can be arrived at of the results of treatment by different methods. Another important point is relative selection, in that many clinics in America operate only on patients with Stage I and Stage II growths and fail to give the whole picture. What has been done with their patients with Stage III and Stage IV growths? Undoubtedly they have been turned over to the

The first objection is that it is a mutilating procedure. This is comical, as it is no more mutilating than any total hysterectomy admitted to be necessary in serious pelvic disease.

Even before radiotherapy was introduced some schools became frightened of its once high primary mortality rate and turned to the Schauta vaginal operation, with its supposedly lower mortality rate. The figures presented in Table I disprove this impression. Besides, most Schauta enthusiasts select Stages I and II cases, and even with the widest exposure cannot make so clean a sweep of the lymphatic gland chains as those operating by the

TABLE VIII.

Survival Rate Excluding Stage IV and Deaths from Intercurrent Disease, 1930 to 1946 Inclusive.

Treatment.	Stage IV Excluded.		Stage IV and Intercurrent Disease Deaths Both Excluded.	
	Five Years.	Ten Years.	Five Years.	Ten Years.
(a) Application of Radium and surgery	55.3%	49.4%	56.5%	51.3%
(b) Application of radium alone	21.6%	12.0%	22.0%	12.3%
(c) Average of (a) and (b)	38.4%	34.0%	39.6%	31.8%

radiotherapists. Their operative results must be averaged with their radiotherapeutic results if the results of treatment of cancer of the cervix are to claim scientific accuracy.

Comparison of Results of Treatment.

Before our local results are reviewed *in toto* it will be of interest to compare the results of our combined treatment with radium and surgery with those of clinics which have an ample number of cases and rely on the Wertheim and Schauta hysterectomy for the cure of cervical cancer. It may be added that Stoeckel and other advocates of the Schauta operation confine themselves mostly to Stages I and II of the disease. The Wertheim group essayed even Stages III and IV, and recent advocates, like Brunschwig, have no contraindication to operation. We in Sydney do not operate on patients with Stage IV growths.

Tables V to XII show our five and ten years figures (1930 to 1951 inclusive). All patients treated are submitted to radiotherapy, and a radical Wertheim procedure is carried out on all suitable patients on an average five to six weeks later. Our operability rate (Stages I, II and III) is 51.4% of all patients examined.

We admit that only our inoperable patients are left to radiotherapy, and this accounts for our poor curative results with this type of treatment.

The Wertheim operation has been under attack by the advocates of radiotherapy for so long that I will not waste time in describing the technique of the operation, which will be found in the numerous text-books published; but I will try to answer some of the criticisms made against it.

TABLE IX.

Royal Prince Alfred Hospital, Sydney: Five- and Ten-Year Absolute Cure and Survival Rates of Carcinoma Cervicis Uteri—Adenocarcinoma, 1930 to 1946.^{1, 2}

Observation.	Five Years.	Ten Years.
All patients examined	46	30
All patients treated	45	30
Alive without recurrence	8	5
Dead of carcinoma	38	25
Survival rate	17.4%	16.7%

¹ Of 17 patients upon whom Wertheim's panhysterectomy was performed, in one case only was lymph gland involvement present.

² No patient with adenocarcinoma who was treated with radium alone survived five years.

abdominal route, with the unfortunate result that many patients with gland involvement are denied the possibility of a five or ten year cure.

Next came the Taussig lymphadenectomy in 1934, which was a compromise with the radiotherapists. The uterus was in most cases left so that it might serve the convenience of radium application. It was on similar lines to removal of the glands of the neck and treatment of cancer of the lip by radium. It never was anything but a compromise, and a bad one at that.

Taussig was a pupil of Wertheim in 1902, and followed almost slavishly the technique of his master in removing the lymph gland chains; but professional opinion in the United States of America (1934) forced him to compromise with the radiotherapists. What a pity to leave a "dead tooth" in the pelvis, when from his training he must have been expert in the performance of the radical Wertheim operation!

Whenever the subject of Wertheim's operation was discussed in the many clinics of the Continent, Britain and the United States of America which I visited in 1951, there was expressed the great danger to the ureter in performing it. When I said that in nearly 500 such operations at Royal Prince Alfred Hospital only one ureteral fistula had resulted and that it had healed spontaneously, I saw by the expressions of my hearers that they did not believe me. Nevertheless, that was the local state of affairs up to December 31, 1952. Meigs, of Boston, has 13.9% of ureteral fistulae, notwithstanding that he operates only on patients with Stages I and II growths. Our colleagues in Melbourne get an even higher percentage. In 1922 Franz, at the *Charité* hospital, Berlin, was implanting his forty-

TABLE XA.

Royal Prince Alfred Hospital, Sydney: Five-Year Survival Rate of Carcinoma Cervicis Uteri—Adenocarcinoma, 1930 to 1946 Inclusive.

Treatment.	Stage I.		Stage II.		Stage III.		Stage IV.		Total.	
	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.
Application of radium and surgery	2	1	9	4	6	3	—	—	17	8
Application of radium alone	1	—	3	—	17	—	7	—	28	—
NH, or incomplete surgery	—	—	—	—	—	—	1	—	1	—
Total	3	1	12	4	23	3	8	—	46	8

TABLE XB.

Royal Prince Alfred Hospital, Sydney: Ten-Year Survival Rate of Carcinoma Cervicis Uteri—Adenocarcinoma, 1930 to 1946 Inclusive.

Treatment.	Stage I.		Stage II.		Stage III.		Stage IV.		Total.	
	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.
Application of radium and surgery	2	1	3	1	5	3	—	—	10	5
Application of radium alone	—	—	3	—	12	—	5	—	20	—
Nil, or incomplete surgery	—	—	—	—	—	—	—	—	—	—
Total	2	1	6	1	17	3	5	—	30	5

fourth ureter into the bladder for fistula following the performance of the Wertheim operation. He told me that provincial surgeons throughout Germany were attempting the Wertheim operation, and that those patients who did not die came with ureteral fistulae to the *Charité*. Even in those early days it was recognized that such radical operations should be performed only by the senior members of well-staffed and well-organized hospitals.

The Sydney ureters cannot be different from the London or Melbourne ureters, so there must be reasons why the two last-mentioned leak post-operatively.

TABLE XI.

Royal Prince Alfred Hospital, Sydney: Carcinoma Cervicis Uteri, 1930 to 1946—Lymph Gland Involvement. Five- and Ten-Year Survival among Patients Submitted to Radical Surgery and Found to have Lymph Gland Involvement.

Observation.	Five Years.	Ten Years.
Number of patients submitted to surgery	284	190
(a) Number found not to have gland involvement	225	151
(b) Number found to have gland involvement	59	39
Percentage of patients with gland involvement	20.8%	20.5%
Number alive in Group (a)	138	85
Number alive in Group (b)	19	9
Survival rate in Group (a)	61.3%	56.3%
Survival rate in Group (b)	32.2%	23.1%

The ureter must be treated with respect. First, patients certainly should not have catheters inserted to make location of the ureters easy for the operator. Secondly, ureters should be gently detached and not stripped of their filamentous surrounding tissues. Ureters in my experience seem immune to invasion by cancer cells, and there is no need to clean them so that they hang like two polished cables from the brim of the pelvis to their entrance into the bladder. Thirdly, ureters should never be squeezed by forceps, held aside by tapes or retractors or pulled forcibly from their few flimsy attachments to the lateral wall of the pelvis, especially near the brim or towards their distal entrance to the bladder.

Much nonsense is talked by occasional operators about the radical nature of the extirpation or otherwise—how

much cleaner the pelvis is left anatomically by one or another surgeon. Once the ureters have been isolated and the bladder has been freed there remain to be removed only (i) extensions of the growth to the neighbouring parametria, (ii) the lymphatic glands, and (iii) a sufficient cuff of vagina. The extensions of growth into the surrounding connective tissue are always continuous with the original growth in the cervix and are removed with the uterus. The ureteral gland always goes with this mass. The next glands most likely to contain metastases are the hypogastric glands in the vascular triangle, and if the true vaginal wall is involved, the obturators. In cervical cancer the presacral glands are rarely involved and the external iliacs only rarely. Now there is much talk about removing these chains of glands in a continuous sheet down to the cervical growth. This is often impossible, as the intervening fatty tissue is not strong and breaks easily. Furthermore, it is of no importance, because the delicate connecting lymphatic vessels are never the seat of cancer and the rest of the connexion is only adipose tissue. The large, fat, juicy, oblong and soft glands always indicate sinusitis, but the hard, grey, spherical glands are always malignant.

Let us consider the amount of the vagina to be removed. If the growth has not poured out onto the vaginal wall proper, half an inch is enough to remove. If it has invaded the true vaginal wall, then you must use your judgement as to how much of the vagina you must extirpate. The radicalists who go down as far as the introitus are overstepping the mark needed for a ten-year cure.

Conclusion.

To conclude my remarks on carcinoma of the cervix, world statistics, both for surgery and radiotherapy and their combinations, give a five-year absolute cure of one-third and a ten-year cure of one-quarter of all patients examined. In face of these facts let us bow our heads and be modest and certainly not waste our energies in strife about the relative merits of one form of treatment against another, but bend our energies to save more of these unfortunate sufferers. Let us not close our minds to the possibility of a serological or chemical cure. Let us strive to find the continuing cause of cancer, as cause usually precedes cure.

TABLE XIII.

Royal Prince Alfred Hospital, Sydney: Carcinoma Cervicis Uteri, 1930 to 1946 Inclusive—Lymph Gland Involvement. Five-Year Survival among Patients Submitted to Radical Surgery and Found to have Lymph Gland Involvement.

Condition of Glands.	Stage I.		Stage II.		Stage III.		Stage IV.		Total.	
	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.
Glands not involved	40	30	108	64	77	44	—	—	225	138
Glands involved	1	—	25	11	33	8	—	—	59	(61.3%) 19 (32.2%)
Total	41	30	133	75	110	52	—	—	284	157 (55.3%)

TABLE XIII.

Royal Prince Alfred Hospital, Sydney: Carcinoma Cervicis Uteri, 1930 to 1946 Inclusive—Lymph Gland Involvement. Ten-Year Survival among Patients Submitted to Radical Surgery and Found to have Lymph Gland Involvement.

Condition of Glands.	Stage I.		Stage II.		Stage III.		Stage IV.		Total.	
	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.	Number.	Alive.
Glands not involved	31	19	66	38	54	28	—	—	151	85
Glands involved	1	—	14	3	24	6	—	—	39	(56.3%) 9% (23.1%)
Total	32	19	80	41	78	34	—	—	190	94 (49.4%)

TREATMENT OF CANCER OF THE CORPUS UTERI.

Although there are still some differences of opinion about the treatment of cervical cancer, world opinion is almost unanimous that cancer of the corpus should be treated by radical surgery. Some believe that a total hysterectomy with the removal of both Fallopian tubes and ovaries is sufficient, and others advocate routine Wertheim hysterectomy with complete lymphadenectomy in all cases except when the patients are senile, debilitated and frail women; they are then satisfied with the less radical procedure. In

TABLE XIII.

Royal Prince Alfred Hospital, Sydney: Five- and Ten-Year Survival Rate of Carcinoma Corporis Uteri, 1930 to 1946.

Treatment.	Number.	Alive.	Deaths.		Lost.
			Post-Operative.	Other.	
Five-Year Survival.					
Radium and surgery or surgery alone	90	62 (68.9%)	2	25	1
Radium alone	25	4	4	17	—
Radium with incomplete surgery	3	1	1	1	—
Nil, or incomplete surgery alone	6	—	3	3	—
Total	124	67 (54%)	10	46	1
Ten-Year Survival.					
Radium and surgery or surgery alone	54	28 (51.8%)	2	21	3
Radium	15	1	2	12	—
Radium with incomplete surgery	1	—	1	—	—
Nil, or incomplete surgery alone	3	—	1	2	—
Total	73	29 (39.7%)	6	35	3

very advanced cases some surgeons practise the pre-operative application of radium and Röntgen therapy to reduce the size of the tumour mass prior to radical removal. In desperate cases mass curettage *plus* the intra-uterine application of radium may lessen the hæmorrhage and discharge. The same may be said to be the treatment in advanced cervical carcinoma, except that added radium application is almost certain to result in death from anuria or fistula formation. In this last and desperate case the patient is better left to sedatives and good nursing.

REMINDERS.

1. As an anticancer measure it is most important to feel, to look and to test contact bleeding even in unsuspected cases.

2. In suspected cases all tests—Schiller, Antoine, Hinselman, Papanicolaou, but above all the biopsy—must be performed.

3. All patients with chronic cervicitis should undergo biopsy before resort is had to diathermy or repair. By such a procedure many early cancers will be discovered.

4. Before hormone therapy or other treatment for uterine bleeding is resorted to the possibility of cancer should always be excluded.

5. Hæmorrhage during pregnancy should never be treated without a previous inspection of the cervix to exclude cancer, polypi, inflammation *et cetera*.

6. The operation of subtotal hysterectomy should be abandoned except in a few rare desperate cases. Far too many cases of uterine bleeding are dealt with by this partial operation when the source of the hæmorrhage is in the cervix. How disheartening it is to have to deal with a residual cervix in which the cut through the cervix has bisected a cancer! Apart from cancer, the residual cervix is a possible chronic source of discharge and inflammation.

7. In the presence of cancer no attempt should be made to conserve ovaries, and complete lymphadenectomy must always be performed as a part of the radical Wertheim hysterectomy.

8. The treatment of carcinoma of the uterus should be left in the hands of specialist groups. The real duty of the general practitioner in this fight against the disease is its early recognition. On no account continue to treat a cervix with chemicals and diathermy without excluding the possibility of cancer.

ACKNOWLEDGEMENTS.

Finally I wish to thank the staff of the King George V Memorial Hospital for Mothers and Babies, Royal Prince Alfred Hospital, for their cooperation and especially Mr. Frederick Chenhall, Mr. Frank Pigott and Miss Cunningham, the Secretary, for their supervision of the statistical returns.

PREGNANCY AND MALIGNANT DISEASE.¹

By R. B. C. STEVENSON,
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I HAVE divided my subject, pregnancy and malignant disease, into sections under four headings: (i) extra-genital malignant disease during pregnancy; (ii) genital malignant disease, including breast carcinoma, during pregnancy; (iii) extra-genital malignant disease followed by pregnancy; (iv) genital malignant disease, including breast carcinoma, followed by pregnancy.

It is generally accepted that malignant growths are more common in those organs which are the site of rhythmical or cyclical changes, such as the alimentary canal, the breasts, the uterus and the ovaries.

¹ Presidential address delivered to the Section of Obstetrics and Gynaecology of the New South Wales Branch of the British Medical Association on November 19, 1952.

Pregnancy is a period of general growth-stimulation and the formation of new tissues.

The breasts enlarge and become increasingly vascular and increasingly active as pregnancy advances. There is epithelial proliferation of the glandular tissues of the breast.

The uterus enlarges and becomes increasingly vascular. The existing muscle fibres of the uterus hypertrophy, and new muscle fibres are laid down. The endometrium enlarges, and the characteristic changes which occur to bring about the decidua of pregnancy are familiar to you all.

Then the new element from the fœtus comes into play, the chorion, which is endowed with proliferative and invasive powers, to form the placenta.

Important and only comparatively recently known changes occur in the *cervix uteri* during pregnancy, as evidenced by great proliferative activity of the cervical mucosa; the glands increase in size, number and tortuosity, so that at the end of pregnancy the mucosa forms a spongy mass which makes up as much as one-half of the entire bulk of the cervix. A lacy adenomatous pattern is seen in the glands, whose lumina are filled with mucus. Stieve (1927), quoted by Novak (1940), states that these changes extend downwards as far as the glands under the squamous epithelium in the neighbourhood of the external os.

It has also been suggested that metaplasia, such as is seen in conjunction with erosion and other chronic inflammatory conditions of the cervix, occurs in the cervix during pregnancy. Hofbauer (1939) has observed these changes in the pregnant cervix, but the fact that metaplasia occurs fairly commonly in the non-pregnant cervix casts some doubt on the view that the pregnancy in itself is the cause of these changes.

Œstrogen production is greatly increased during pregnancy. It has been estimated that the average healthy woman produces about 10 milligrammes of œstrogen during a menstrual cycle. Bowes (1950) claims that excretion assays have shown that in late pregnancy the daily production of œstrogen reaches 50 to 100 milligrammes.

Œstrogen has been considered as a possible ætiological factor in malignant disease. It belongs to the same group of hydrocarbons as do the carcinogenic substances in coal tar which have been proved to cause carcinoma. The work of Gemmell and Jeffcoate (1939) provides evidence that œstrogen and the gonadotropic factors of the anterior pituitary lobe promote hyperplasia and metaplasia, and that in mice which have been rendered susceptible, œstrogen produces mammary carcinoma.

The proliferation and downgrowths of the cervical epithelium which occur during pregnancy are believed by Hofbauer (1939) to be brought about by the large amounts of œstrogenic or gonadotropic hormones present.

It is an undisputed fact that endometrial hyperplasia, simple or cystic, is brought about by the unopposed action of œstrogen.

In the same uterus may be seen all grades of hyperplasia and frank adeno-carcinoma (Gemmell and Jeffcoate, 1939).

The rapid growth of fibro-adenomata of the breast which occurs in pregnancy may be brought about by the action of œstrogen (Geschicter and Lewis, 1938).

The rapid and almost universal enlargement of fibro-adenomata of the uterus during pregnancy may be brought about by the growth-stimulating properties of the large amounts of œstrogen present. The enlargement of fibroid tumours during pregnancy may be said to be due to the general growth of the uterus, but solitary broad ligament fibroid tumours and fibroid tumours connected by only a thin pedicle to the outer surface of the uterus share in the enlargement.

Extensive increase in size of a fibroid tumour during pregnancy is illustrated by the case of Mrs. C.D.C.:

CASE I.—Mrs. C.D.C. had her first baby when she was thirty-two years old. The baby was a boy and weighed eight pounds five ounces at birth. At the post-natal examination six weeks after the birth it was noted that the mother had a

fibroid tumour the size and shape of the terminal phalanx of the index finger, growing out into the right broad ligament from the right side of the cervix.

Just over two years later this patient commenced her second pregnancy, and when she was examined at ten weeks' gestation it was noted that the fibroid tumour on the right side was about the size of a small orange. In view of the fact that the tumour was arising from the cervix and that it was large enough to obstruct the birth canal, it was decided to allow the pregnancy to proceed to term and then to perform Cæsarean section.

When the Cæsarean section was performed approximately seven months later it was noted that the cervical fibroid tumour had increased so much in size that it completely filled the *pelvis minor*. Numerous large blood vessels were seen coursing over the surface of the tumour, so no attempt was made to remove the uterus and fibroid tumour at that stage. When the patient was examined two months after the birth of this second child the tumour had involuted to the size it was at the commencement of this pregnancy.

The patient did not report for hysterectomy until two and a half years later, when it was found that the fibroid tumour had grown in this time to the size of a very large orange. When total hysterectomy was performed it was noted that the tumour originated from the right side of the cervix between the uterine artery, which it displaced upwards, and the ureter, which it displaced downwards.

I have reported this case because it affords accurate observation of rapid enlargement of a fibroid tumour during pregnancy and rapid involution following the pregnancy.

These facts tend to incriminate œstrogen as one of the causative agents in carcinoma, at least as far as the uterus and breasts are concerned.

Gemmell and Jeffcoate (1939) have reported three cases of carcinoma of the *cervix uteri* occurring amongst 43 women treated with œstrogen for non-malignant senile conditions of the vagina and vulva.

Against these arguments must be weighed the fact that a tremendous number of women become pregnant and therefore have large amounts of circulating œstrogen, but only a few of those women develop carcinoma.

There must be other accessory factors present, such as genetic conditioning, trauma, chronic inflammation, deficiency of vitamin B, and impaired liver function.

It is, of course, well known that œstrogen is deactivated in the liver, and this process is enhanced by the presence of thiamine. This has led to the interesting assertion by Ayre (1946) that cervical cancer may be "a disordered growth response to inflammation in the presence of œstrogen excess and nutritional deficiency".

It will thus be seen that of the factors involved in the possible ætiology of carcinoma, œstrogen excess is present in pregnancy in all cases, while in some cases hereditary factors, trauma, chronic inflammation, thiamine deficiency and impaired liver function are also present.

However, it should be noted that progesterone, morphine, male sex hormones, vitamin D and cholesterol belong to the same chemical group as œstrogen, and none of these substances has been suspected of causing carcinoma.

Œstrogen has not been proved to cause carcinoma in the human, though amongst other things it has been suspected of accelerating cancerous changes in *leucoplakia vulva*.

The fact that œstrogen will cause carcinoma in mice does not necessarily prove that it will do so in the human species.

No single individual has experience of enough cases of pregnancy in association with or following malignant disease to provide statistical data. The records of the hospitals provide only a few cases, and the medical literature does not report large numbers of cases.

However, Westberg (1945) has reviewed 222 cases of carcinoma of the breast occurring in pregnant or nursing women. These cases were collected from all over Sweden. The study of this series involved also the study of a series of 3000 cases of breast cancer occurring in non-pregnant women. Since the mortality rate from cancer

of the breast is probably greater in younger than in older women, Westberg selected as a control series in the non-pregnant group only those women who were under thirty-five years of age.

On the basis of this study he found that the death rate in the pregnant or lactating group was only slightly higher than that in the non-pregnant group. He found also that there was no difference in the death rate from cancer of the breast in married and unmarried women under the age of forty-five years.

This finding would tend to show that pregnancy does not alter the prognosis in the human, as it does in mice, in which pregnancy has been proved to cause a higher incidence of breast cancer than that found in mice which have been prevented from breeding.

Westberg's conclusion is that therapeutic abortion does not improve the prognosis in carcinoma of the breast.

Morton (1951) supports this conclusion from his own observations.

Extra-Genital Malignant Disease During Pregnancy.

If a malignant neoplasm is discovered during the course of pregnancy, a decision has to be made on whether the pregnancy will have an adverse effect on the neoplasm.

In the light of the discussions put forward in this paper, it might be stated that the pregnancy would accelerate the rate of growth of the tumour. For this reason and for humane reasons, it might be thought advisable to terminate the pregnancy. But is one scientifically justified in arriving at this conclusion? The only answer is "not proven".

The neoplasm must be treated immediately in the same manner as it would have been treated had the pregnancy not been present.

If, by reason of the situation of the neoplasm, surgical access is not possible because of the presence of the enlarged uterus, or because any deep X-ray therapy given would pass through the uterus, then the pregnancy must be terminated.

The following cases depict extra-genital neoplasm in association with pregnancy.

CASE II.—Mrs. H.F., aged thirty-three years, an epileptic, was admitted to the Women's Hospital, Crown Street, Sydney, on July 19, 1950, suffering from second degree burns involving the right breast and both thighs, and with signs of a threatened miscarriage. Her last menstrual period had been on April 27, 1950. She had had two previous children and one previous miscarriage.

Apart from the burns and the pregnancy of ten weeks' duration it was noted that the patient had a melanoma, 1.5 centimetres in diameter, on the postero-lateral aspect of the middle of the right leg. The patient was certain that it had been only the size of a match head six weeks previously.

The threatened miscarriage settled down and when the burns had nearly healed Dr. C. E. Winston widely excised the melanoma. Dr. Murray Moyes reported as follows:

Macroscopic: Received a diamond-shaped piece of skin with subjacent adipose tissue. In the centre of the skin is a sharply outlined, slightly raised black area, 1.5 centimetres in its greatest length and 0.8 centimetre in its greatest width.

Microscopic: There is moderate hyperkeratosis over the raised area of skin, and in this situation the epidermis is thinned, sometimes markedly, so that it is only one or two cells thick. Extending from the under surface of the epidermis are branching interpapillary processes of varying width, but generally narrow. Between the dermis and the epidermis, with its interpapillary processes, are numerous solid alveoli of cells with a varying appearance. Those closest to the dermis have the form of typical naevus cells, but their character changes as the epidermis is approached, and they become larger, pleomorphic, and in the most atypical form are moderately anaplastic and in structure polygonal or rounded with a clear cytoplasm, and a nucleus sometimes hyperchromatic, occasionally mitotic, but mostly vesicular with rather prominent nucleoli. At the same time a less obvious transition between these pleomorphic cells and the basal layer of the epidermis is also

evident. No naevus or atypical naevus cells have extended through the epidermis. Pigment is irregularly distributed and mostly not prominent, but the amount in individual cells is often so great as to obscure nuclear detail; it is also apparent in some cells of the epidermis.

The picture is one of early malignant change in a mole and is consequently that of a malignant melanoma.

Professor Keith Inglis agreed with this report and also stated that in his opinion the pregnancy would not materially alter the course of events which might occur as the result of the melanoma. The patient was seen in consultation by Dr. J. N. Chesterman, Dr. H. A. McCredie and Dr. F. A. Bellingham, and it was decided to allow the pregnancy to continue.

When the gestation had reached thirty-one weeks the patient developed a concealed accidental hæmorrhage. In view of the past history and the fact that the fetal heart beat was irregular, I decided to perform a lower segment Cæsarean section. The mother made an uneventful recovery, but the baby, which weighed five pounds one ounce, died when eight hours old.

Microscopic examination of the placenta revealed no evidence of metastases. Post-mortem examination of the baby revealed pulmonary emphysema and pulmonary collapse, but no evidence of metastases.

The mother has remained well up to the present time, that is, two years from the time of excision of the mole.

CASE III.—Mrs. J.D., aged thirty-one years, was a *primigravida*, whose last menstrual period had been on July 3, 1951. At the commencement of her pregnancy she had had a black mole about one centimetre in diameter on the right forearm, slightly raised above the surrounding skin surface. She stated that it had been present for as long as she could remember.

There was no change in this mole until the twenty-eighth week of pregnancy, when it began to increase in size, and by the thirty-first week it had approximately doubled its size. Dr. C. E. Winston widely excised the mole together with the axillary glands on February 20, 1952. The pathologist reported as follows: "Malignant melanoma. No involvement of the glands."

Labour was induced two weeks before term (that is, on April 2, 1952), as signs of pre-eclampsia had developed. The patient had a healthy male infant. There were no signs of melanoma in the placenta.

Mother and baby have remained well up to the time of preparation of this paper.

Hill (1944) reports two cases of malignant change in pigmented moles during pregnancy. Hadley (1952) reports a case of malignant melanoma during pregnancy with a fatal result.

Sir Eardley Holland (1949) quotes the case reported by Friedrick in 1866 of a woman who died a few days after labour with carcinoma of the liver and general carcinomatosis. Her baby died when nine days old and was found to have a carcinoma on the left knee of exactly the same histological type as that of the mother.

Smith (1937) reports five cases of sarcoma, five cases of malignant melanoma, two cases of adenocarcinoma of the stomach, one case of carcinoma of the tongue and one case of epidermoid carcinoma of the parotid, occurring during pregnancy. The five patients with sarcoma all lived for a minimum period of two and a half years, the five patients with melanoma all died within twenty-two months, the patients with carcinoma of the stomach and tongue died, and the patient with carcinoma of the parotid was alive three years later.

Genital Malignant Disease, Including Breast Carcinoma, During Pregnancy.

The incidence of carcinoma of the cervix during pregnancy has been varying reported as between one in 5000 and one in 20,000 cases. In recent years the incidence has considerably increased. The reason for this increase is probably the earlier detection of carcinoma by the Papanicolaou method, confirmed by serial biopsies, and the inclusion of cases of carcinoma *in situ*.

When carcinoma of the cervix is discovered during pregnancy it must be treated forthwith by the means most

appropriate to the case, regardless of the pregnancy. The only exception is perhaps the case in which the foetus is close to viability when the carcinoma is first discovered. Under these circumstances a delay of three or four weeks before commencing treatment may be advisable.

Here I should like to report the cases of Mrs. M.J. and Mrs. J.H.

CASE IV.—Mrs. M.J., aged twenty-seven years, was admitted to the Women's Hospital, Crown Street, Sydney, on December 10, 1951. She had attended the out-patient department, where it was found that she was four months pregnant and that she had an ulcer of the cervix which bled on being swabbed. She had had one child six years previously. A biopsy was taken from the anterior lip of the cervix on December 12. This revealed squamous carcinoma, the pathologist's report being as follows:

Numerous medium-sized to large solid alveoli of markedly anaplastic epithelial cells are invading the connective tissue stroma of the cervix. Rarely there is a poor attempt at epithelial pearl formation, and occasionally prickle cell borders are present.

Squamous carcinoma.

On December 19 hysterotomy was performed by the abdominal route with an incision through the fundus of the uterus. On December 27 a confirmatory biopsy was taken and radium was inserted into the uterus, cervix and lateral vaginal fornices. The second biopsy again revealed squamous carcinoma. The total dosage of radium given was 7000 milligramme hours.

On February 6, 1952, I performed radical Wertheim hysterectomy with removal of regional glands. This date was approximately five and a half weeks from the insertion of the radium.

The pathologist's report of the cervix is interesting, as it reveals an area of apparently active carcinoma, despite the radium. It reads:

There is moderate necrosis of the cervix and in some areas an accompanying inflammatory reaction together with a few foreign body giant cells. In one situation a solitary island of slightly anaplastic apparently viable epithelial cells is evident in the centre of a necrotic area; these cells resemble those of the squamous epithelium and are presumably residual carcinoma cells.

The patient has remained well up to the time of preparation of this paper.

CASE V.—Mrs. J.H., aged twenty-nine years, was pregnant for the second time. Her last menstrual period had been on November 13, 1950. She was due to be delivered on August 25, 1951. When about ten weeks pregnant she complained of a lump in the left breast. She was very worried about this, because her mother had died from cancer of the breast. Biopsy revealed scirrhous carcinoma. Dr. C. E. Winston performed simple mastectomy on March 6, 1951, and this was followed by a course of deep X-ray therapy. The pregnancy continued, and on August 7, 1951, a healthy son was born. Examination of sections revealed no abnormalities in the placenta. The mother and baby have remained well up to the time of preparation of this paper.

Smith (1937) reports five cases of carcinoma of the cervix during pregnancy, two cases of embryonal carcinoma of the ovary and one case of epidermoid carcinoma of the urethra.

MacRae (1951) reports a case of chorionepithelioma which occurred during pregnancy. The patient died one week after Caesarean hysterectomy.

Hill (1944) reports the interesting case of a woman who was known to have a slow-growing scirrhous carcinoma of the breast for which she refused treatment. She started on her fourth pregnancy, and was not seen until the thirty-sixth week, when the breast lesion was found to be fungating and her condition appeared hopeless. A successful labour with birth of a healthy child occurred spontaneously soon afterwards. After the delivery the breast lesion rapidly regressed, and when surgery was undertaken a few weeks later, to which the patient then agreed, the condition was found to be completely operable. The author states that this case offers a good example of rapid progress of a breast cancer during pregnancy with subsequent retrogression following parturition.

Extra-Genital Malignant Disease Followed by Pregnancy.

Here I should like to report the case of Mrs. W.O.F.

CASE VI.—Mrs. W.O.F., now aged thirty-six years, had a recurrent tumour widely excised from the muscles of the right side of the back in 1944 by Dr. B. T. Edye. The pathologist reported:

The sections show a connective tissue neoplasm composed of interlacing bundles of spindle-shaped cells, among which are numerous thin-walled blood vessels. The margins of the growth are infiltrating adipose tissue and well-formed fibrous tissue, and histological examination confirms the macroscopic evidence of extension of the growth to the margins of the excised tissue.

The degree of local malignancy is to be regarded as of high grade.

Four years after this the patient had a pregnancy which was complicated by hydramnios and later by a concealed and revealed accidental haemorrhage resulting in the birth of a stillborn achondroplastic dwarf, five weeks before full term. Another pregnancy occurred in 1950 and resulted in the birth of a full-time, healthy, female infant.

The patient and her baby have remained well up to the time of preparation of this paper.

Sir Eardley Holland (1949) reports the case of a woman, aged twenty-five years, who had a melanoma removed from the inner surface of the left thigh. Four months later there were signs of recurrence, so wide local removal with dissection of the glands of the groin was performed. Two months after this the patient married, and she became pregnant soon afterwards. When the pregnancy had reached nearly full term the patient was found to have secondary nodules scattered over the thigh and abdomen and was extremely ill. Caesarean section was performed. The placenta was found to contain melanomatous nodules. The mother died three months later, and the baby died ten and a quarter months later, and melanotic tumours were found in the liver of the baby.

This case is interesting because it demonstrates beyond any shadow of doubt the passage of melanoma cells from the mother to the placenta and then to the foetus; and also because it demonstrates what may happen when pregnancy occurs soon after surgical excision of a malignant melanoma.

Smith (1937) reports one case of pregnancy following four and a half years after excision of a malignant melanoma of the left foot. The mother and baby were well six years after the birth.

The same author reports another case of melanoma of the right calf. The patient became pregnant six months later. Recurrence took place. The baby was delivered prematurely at seven months, and was alive and well two years later; but the mother died one month after the birth.

He also reports four cases of pregnancy following excision of sarcoma. One mother died one year after the birth; the other three were alive four, five and twelve years after the birth. The patient who died had commenced her pregnancy eight months after treatment of her sarcoma. The other patients had had a much longer interval before becoming pregnant.

Genital Malignant Disease, Including Breast Carcinoma, Followed by Pregnancy.

The nature of the disease and its treatment preclude pregnancy from starting after malignant disease of the cervix, vagina or ovaries. There are consequently no cases on record of this nature. Pregnancy does occur, however, after carcinoma of the breast.

Successful full-time pregnancy following treatment of a carcinoma of the breast is extremely rare. I am unable to find the records of such a case in Sydney. However, since R. A. Willis (1948) in his text-book "Pathology of Tumours" states that the proportion of cancerous breasts which show definite transitions from hyperplastic changes to carcinoma is much higher than 20%, I feel that I am justified in reporting here a case of hyperplastic cystic disease of the breast.

CASE VII.—The patient, Mrs. J.G., now aged thirty years, had undergone radical mastectomy in September, 1947. The pathological report stated that examination of the sections revealed hyperplastic cystic disease, with the hyperplasia mostly confined to the ducts, but that in one part there was irregularity in the growth of the epithelium, suggesting transition to carcinoma. Two years later this patient had a full-time labour and gave birth to a healthy son. Twenty months later still this patient had another healthy son at full time.

The mother and her two babies have remained well up to the time of preparation of this paper, that is, five years from the time of removal of the breast.

There is fairly universal agreement amongst general surgeons that pregnancy should not be permitted following carcinoma of the breast. However, the reports by Smith (1937) and Westberg (1945) have cast considerable doubt on whether this is the correct opinion.

Smith (1937) reports four cases of pregnancy following carcinoma of the breast in which the patients were alive from five to nine and a half years after the pregnancy. He also reports three cases of pregnancy following carcinoma of the breast in which the patients died from two to four years after the birth. This author from his extensive study has concluded that the prognosis for patients who have malignant tumours and pregnancy is better if the tumour follows the pregnancy than if it occurs simultaneously with the pregnancy; also that the prognosis is better if at least two years elapse from the time of treatment of the tumour before pregnancy commences.

There is no available evidence to show that deep X-ray radiation applied to parts of the body, other than the pelvis, during pregnancy will have harmful effects on the foetus.

Dr. C. de Monchaux has told me of a patient he treated. This patient had leuchæmia. She had a very large spleen, which he treated with massive doses of deep X-ray therapy at about the fifth month of pregnancy. The pregnancy went on to term, and a healthy child was delivered. The mother died from leuchæmia a few months after the birth.

Discussion.

From a consideration of the points raised in this paper, from a study of the reports of the cases quoted, from the five cases of which I have personal knowledge, and from a consideration of the conclusions drawn by Smith (1937) and Westberg (1945), I have formed the following conclusions:

1. It is better for patients who have, or have had, malignant disease not to become pregnant.
2. Treatment of all malignant conditions during or after pregnancy should be instituted forthwith.
3. If pregnancy occurs with malignant disease, the malignant disease must be thoroughly treated regardless of the pregnancy. In regard to melanoma the two cases reported by me bear out this conclusion. However, Smith (1937) states that the melanoma should not be treated until the pregnancy is over, and that therapeutic abortion should not be performed, as the melanoma always flares up after this procedure.
4. If pregnancy occurs, therapeutic abortion will not improve the prognosis.
5. In the group of patients with genital malignant disease the pregnancy is usually terminated as a result of treatment.
6. The longer the time that elapses from the treatment of the malignant disease before pregnancy commences, the better the prognosis.
7. Each case must be carefully assessed on its merits.
8. Pregnancy occurring with or after malignant disease is extremely rare, because the commonest age for malignant disease corresponds to the late childbearing or early menopausal ages.

Summary.

Some of the physiological changes of pregnancy have been referred to.

Estrogen in pregnancy and as a possible cause of carcinoma has been discussed.

Possible ætiological factors in malignant disease have been mentioned.

Malignant disease in relation to pregnancy has been discussed under the headings of pregnancy occurring with malignant disease, either genital or extra-genital, and pregnancy following malignant disease, either genital or extra-genital.

Some cases previously reported have been quoted.

The case histories of five patients which had not previously been reported have been given.

Certain conclusions have been drawn, the most important of which is that therapeutic abortion would not appear to alter the prognosis in cases of breast and extra-genital malignant disease.

Acknowledgements.

I wish to thank Dr. R. Mackey for permission to discuss two of his cases.

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THE TREATMENT OF CUTANEOUS NEOPLASMS.¹

By W. C. T. UPTON,
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THE treatment of cutaneous neoplasms is a very comprehensive subject for a short paper, but I was requested by the president and the secretary of the Section of Dermatology to make this contribution.

It is obvious that only a few aspects of the treatment of cutaneous neoplasms can be described in the short time at my disposal. The difficulty has been to decide what to include and what to exclude. I feel that such a paper should not be too technical, nor should it be confined to rare skin tumours. There should be some encouragement for general practitioners to join in any discussion that may follow.

After due consideration, I think a more useful purpose will be served if emphasis is laid on the treatments that I have found most useful after a long experience in dermatological practice.

Before the actual treatment of a cutaneous neoplasm is begun, there are certain principles to bear in mind. I would summarize them as follows: (i) A correct diag-

¹Read at a meeting of the Section of Dermatology, Australasian Medical Congress (British Medical Association), Eighth Session, Melbourne, August 22 to 29, 1952.

nosis is essential. When one is in doubt, a biopsy should be performed. An experienced clinician will rarely find this necessary. This procedure is more often carried out in public hospital practice than on private patients. (ii) As little damage as possible should be done to the surrounding skin. (iii) The patient should be made to suffer as little inconvenience as possible. (iv) The tumour should be completely destroyed or removed. (v) The site of the tumour should be studied. This is because certain areas are more liable to necrosis from radiation than others. (vi) It is important to assess the type of skin we are treating. A delicate florid dry facial skin requires less irradiation than a greasy pigmented skin. I am assuming that the tumours are of the same infiltration or thickness. I have particularly in mind superficial lesions such as keratoses. (vii) There should be a reasonable "follow up" after the treatment of malignant neoplasms. (viii) One should always aim for a good cosmetic result. The last principle must be especially borne in mind when one is dealing with lesions on the exposed areas of female subjects. As fashions vary or as bathing costumes shrink, I feel that this aspect of treatment will have to be considered in relation to nearly all the cutaneous surface.

After such an introduction, I will commence with raised non-vascular naevi, which are more popularly designated as common moles. Moles may be flesh-coloured, brown or darkly pigmented. With regard to pigmented moles, if removal is thought necessary, then there is one and only one treatment, and that is surgical excision. If pigmented moles are on sites free from friction and if there is no evidence of any change, it may be considered wise to leave them alone. Pigmented facial moles in men who cut them whilst shaving should be removed. If the lesions are numerous I have advised the use of an electric razor, and have had a few patients under observation for a number of years.

One is frequently consulted by middle-aged women who want their unsightly moles removed; they are not satisfied with the advice to leave them alone, and in certain cases we can hardly blame them. For years I have treated flesh-coloured and light brown moles with superficial diathermy or fulguration. The technique is to burn them down to the level of the skin surface, then perform a gentle curettage and again apply fulguration just below the skin surface. This procedure can often be carried out without a local anaesthetic. I prefer to work in this way and explain that a better result may be obtained. It is surprising what women will suffer to improve their personal appearance. For a large lesion, a local anaesthetic will be necessary. There is always the tendency to do too much under these conditions.

A point of great practical importance is to treat one mole only in the first place as a trial and wait a few weeks to see the final cosmetic result. What does it profit a woman if she loses her mole and gains an unsightly keloidal scar? If surgical treatment is preferred, the same advice is tendered.

Again I would emphasize that if there is any doubt about the pigment in a mole, then excision is the treatment.

Certain moles are complicated with coarse hairs. It is a good plan if the mole is small to destroy the hairs with a fine needle, using either electrolysis or a special diathermy machine. Sometimes in this way the rest of the mole disappears or is made inconspicuous. For a pigmented hairy mole excision is advised.

I would like to ask if any member present has ever seen a pigmented hairy mole converted into a melanoma by electrolysis for the hairs? I have certainly heard, unfortunately, of pigmented moles that have become malignant from the treatment with a cautery or surgical diathermy.

Precancerous and Cancerous Conditions of the Skin.

A great deal has been written about the treatment of actual precancerous and cancerous conditions of the skin,

but little about preventive measures. I have nothing original to offer, but I feel that this aspect of therapy should be discussed. I am not so much concerned about elderly subjects, but rather with a much younger generation.

It is a common experience to see young men with the "solar" or "Irish" type of skin exposed year in and year out to the hazards of the wind and sun. One is often called upon to treat farmers, graziers and such-like in their early years with these precancerous and cancerous conditions. After suitable treatment their skins still provide the fertile soil for the future seeds of malignant disease. In extreme cases we may offer the advice to seek an indoor occupation, but for the majority we can change neither their skins nor their mode of life. However, I do think we can render the soil a little less fertile, or at least we should strive to do so. During the day a sun-protective cream should be rubbed in two or three times. This preparation should not attract flies and it should be practically greaseless. There are many applications on the market and most contain tannic acid and/or a quinine salt. I have found the following of distinct help as a screen against actinic rays: salol (5%), lanolin (10%), in a greaseless base such as "Dermabase" or "Barrier Cream". Before the patient retires, a greasier cream may be gently massaged into the skin. This should not be so messy as to discourage its use. The following formula is recommended: cod-liver oil (10%) in equal parts of lanolin and cold cream. For those dry cracked lips so well known to dermatologists, colourless lipstick is easy to carry around and easy to apply. Vitamin A given by mouth for young and old subjects has its advocates, but I am not able to assess its value.

Leucoplakia of the Lips.

Leucoplakia of the lips is a common condition varying from a very superficial type to a deeper infiltration. Before any active treatment is applied, one should endeavour to find out and remove the cause. It may be due to smoking or to friction from teeth, natural or artificial. In many mild cases the condition will disappear or at least grow no worse if irritating factors are attended to. I have had many such patients under observation for years. I have seen permanent damage done to lips by the indiscriminate use of X-ray or radium therapy. Small infiltrated patches or areas that look unsightly are efficiently removed with superficial diathermy or fulguration. The charred tissue is gently curetted off and the lip kept under observation.

Keratoses.

I think that we are all in agreement that surgery should play no part in the treatment of keratoses.

There is a type of lesion to which I want to make special reference, and that is what I call "the erythematous keratoma". This lesion, when solitary, may be and can be very difficult to differentiate from a single and early patch of *lupus erythematosus*. This is not the time or the place to discuss diagnosis. If after watching the affected area for a short period, especially if it has been chemically irritated, I still cannot make up my mind, I use carbon dioxide snow. Should the condition turn out to be *lupus erythematosus* no great harm will be done, whereas with irradiation there is a distinct risk of spreading the complaint.

I am sure my colleagues have often seen, both in private practice and in hospital clinics, lesions that have been referred for radiation therapy, but which may present problems as I have indicated. I am also aware that a few authorities recommend irradiation for discoid *lupus erythematosus*.

For all ordinary keratoses the usual methods of treatment are by means of carbon dioxide snow, radium plates and X rays. Since the introduction of the shock-proof X-ray plants, I have become a strong advocate of X-ray therapy. Excellent results may be obtained from radium plates, but the procedure is more prolonged and there is a greater risk of exposure to the operators' hands.

I do not think that any useful purpose will be served in a general paper of this nature by delving into a great deal of technical detail. My usual routine for some years has been to work with the following factors: 100 kilovolts, no filter (except for an oil filtration equal to one millimetre of aluminium), five milliamperes, focal skin distance 15.5 centimetres, half-value layer 1.7 millimetres of aluminium. For very superficial lesions on a delicate skin I usually give 1200r in one dose, for deeper lesions 1500r to 2000r in divided doses of 750r to 1000r on successive days.

Rodent Ulcers and Small Epitheliomata.

In the treatment of rodent ulcers and small epitheliomata I use the same factors as for keratoses, but give from 3000r to 6000r in daily doses. Sometimes filtration from one to two millimetres of aluminium may be added. I have long learnt the value of divided dosage in preference to one single intensive application.

If a bone or cartilage is involved, I refer such patients for plastic surgery. For small epitheliomata of the lips I hesitate to use the doses that some authorities employ with such success. It has been my experience to see some patients with severe necrosis a few years after such heroic irradiation.

I frankly confess that I treat only small lesions and usually apply not more than 3000r in divided doses of 1000r a day. In the case of any larger lesions that may come my way, I shift the responsibility to the surgeon, who will decide upon surgery or deep irradiation.

The sites that I always treat with a good deal of caution are the nose, the naso-labial folds, the inner canthi, the forehead (especially the sides), the back of the hands, and (as I have already indicated) the lips. Looking over the years, I find that it has been my experience to encounter or to obtain more cases of necrosis of the backs of the hands than elsewhere. As a general rule, it would appear wiser to slightly overtreat than undertreat lesions when dealing with skin cancers.

Sometimes I have found it of advantage to remove certain lesions on some of these sites as far as the level of the skin with surgical diathermy. I then apply X-ray therapy 2000r to 3000r in divided doses to the treated area and a little beyond. The idea, of course, is to give a more uniform dose and lessen the risk of radio-necrosis. I use this method for hard, raised, cystic rodent ulcers and well defined epitheliomata with comparatively abrupt margins.

I admit there are certain arguments against this technique, such as the inconvenience of a small minor operation and delayed healing. Surgical incision could be used for some of these neoplasms, but it is always necessary to carry out the excision beyond the apparent margin of the lesion. With the method I recommend, irradiation should take care of this marginal skin. However, I freely admit that surgical treatment cannot be ignored.

Painful Nodule of the External Ear.

Painful nodule of the external ear is a condition often seen and frequently referred for irradiation. This lesion, causing pain on pressure especially when the subject is lying down, is actually a perichondritis and is not suitable for radiation therapy. For superficial lesions, local anaesthesia, fulguration and curettage are sometimes successful. If the cartilage is protruding or if the foregoing procedure fails, then resection of the cartilage is essential.

the techniques outlined are to be found in many of the text-books of ophthalmic surgery, but their collection under one heading and their editing by the author have tended to simplify a branch of surgery which to many is fraught with difficulties.

The book opens with a chapter on the anatomy of the brow and lids; then follow chapters on fundamentals of lid surgery, grafts and technical procedures. The next six chapters are devoted to lid surgery, most space being devoted to technique for the cure of ptosis.

A chapter is devoted to the conjunctiva in which pterygium is dealt with rather shortly and especially the surgery of recurrent pterygia—where, although grafting is mentioned, details of the technique are omitted.

The book is very well produced, is free from error and contains an abundance of diagrams. It is a useful book which would be well worth consulting when one is faced with an ophthalmic plastic procedure.

Internal Medicine: Its Theory and Practice. By John H. Musser, B.S., M.D., F.A.C.P.; Fifth Edition edited by Michael G. Wohl, M.D., F.A.C.P.; 1951. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 10½" x 7½", pp. 1564, with 236 illustrations and 10 plates in colour. Price: £8 1s. 3d.

Dr. WOHL edits the fifth edition of Musser's text-book of medicine, the first edition for eight years. The aim of the book is to present in one volume a comprehensive survey of the entire field of internal medicine. As a result the text appears to have been almost entirely re-written. In this colossal task Dr. Wohl has been assisted (in the American style) by eighty contributors. A real effort has been made to integrate the basic sciences with bedside medicine, and in this respect this book is better than most comprehensive text-books of medicine.

The text is set out in seven major sections, the first dealing with infectious diseases. This section deals very fully with all the diseases caused by living organisms and discusses their treatment very adequately. It is felt that there can be no disease of this type about which an adequate clinical description cannot be found. This section occupies a quarter of the whole text.

The second short section deals with diseases due to physical and chemical agents and has a good section dealing with modern industrial toxicology. The third section deals exhaustively with diseases of nutrition, metabolism and endocrinology. The physiological and biochemical parts of this section are very well written for a text-book of this type. Section four deals with diseases of allergy and collagen diseases and is entirely modern.

Section five deals with systemic diseases, including diseases of the heart, respiratory tract, kidneys, circulation, blood, alimentary tract and locomotor system. Included in this section is an extremely good chapter on genetics and medical practice. Though short, it gives a concise, practical exposition of many of the hereditary aspects of medicine, particularly in relation to prognosis.

Section six is concerned with geriatrics and rehabilitation. These subjects, which are assuming more and more importance each year, are treated very well and from a practical point of view. The introduction of this section into a text-book of medicine is considered to be a very good feature.

The last section deals with diseases of the nervous system including psychiatry in the same way as the systemic section (five). These two last-mentioned sections are refreshingly brief and occupy a little less than half the total text.

A very good feature of this book is the adequate list of references given after the description of practically every condition. Although reference is not made to these in the text it is easy to trace further reading on any particular subject. The table of contents occupies fourteen pages, and this in conjunction with a very complete index occupying twenty-five pages makes it easy to use this book for rapid reference. The text is printed in two columns with clear type on good quality paper, and Dr. Wohl and his collaborators are to be congratulated on producing a text-book of medicine which is both complete and up to date. No constructive criticism can be levelled at this book.

Reviews.

Ophthalmic Plastic Surgery. By Sidney A. Fox, M.S. (Ophth.), M.D., F.A.C.S.; 1952. New York: Grune and Stratton. 10½" x 7", pp. 304, with 133 illustrations. Price: \$15.00.

In "Ophthalmic Plastic Surgery" Sidney A. Fox has collected plastic procedures which have proved adequate in his hands, and has refrained from collecting all known procedures which would tend to cause confusion. Most of

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Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

BIOCHEMISTRY AND THE KITCHEN.

ONE wide field of biochemistry remains practically unexplored, and that is the scientific examination of the appetizing attributes of food. The biophysicist looks upon skeletal muscle as a prime mover of remarkable efficiency and adaptability, differing from the engines made by man in requiring little if any attention to starting effort, best speed, greatest power at that speed and greatest power obtainable and for how long without injury. The biochemist has unravelled a strange story of sequent explosions of organic phosphates and the culminating oxidation of carbohydrate, also the changing configuration of long chain carbon compounds. These are all fascinating investigations, but they throw no light whatsoever on skeletal muscle as it appears on the dining table. Why, for instance, should the psoas have a characteristic flavour absent from other and even adjacent muscles? We find this in the undercut of sirloin, in the corresponding part of the loin chop and in the pork fillet. The flesh of the young mammal before weaning has special qualities, better utilized by continental than by Australian cooks. Veal is so different in its culinary appeal from the flesh of the adult ox or cow that an affinity is not recognizable; one might easily refuse to believe that the animal which yields veal could, if given a timely reprieve and allowed to grow, produce rump steak and ribs of beef. The sucking pig which aroused Charles Lamb's lyric fervour of adulation is another instance. Custom and law agree in denouncing the flesh of a female mammal which has just parturated as unfit for human consumption. Is there any biochemical basis for this belief? A fish or crustacean containing ova is supposed to be at the peak of its edibility; but should the roe be discharged the attractiveness as a food is seriously reduced. Shakespeare's Falstaff used the term "shotten herring" as signifying utter worthlessness, and today this opinion holds good, though, alas, we often import the "shotten herring" as a Scotch kipper. Can the

analytical chemist give us the basis of this sea change? There is a widespread belief that the pregnant mammal should not be slaughtered for food, but whether there is any foundation for this sentiment is difficult to determine.

The relative amount of connective tissue and the degree of fineness of its structure can influence the quality of meat on the table, but why should ox tail possess a flavour quite unique? True, this organ has little work to do even when flies are troublesome, but how does this really come into the problem?

The liver of mammal and bird contains vitamins and blood-building and nerve-building extrinsic factors; investigation of these lies in the sphere of work of the biochemist, but can any such expert explain the similarity of taste which has nothing to do with bile? Also kidney from ox, sheep and pig possesses a characteristic flavour unconnected with urine. Has any investigator told us to what is due the mild saccharinity of thymus or pancreas when dished up as sweetbread? Adipose tissue varies, as we know, in the body in melting point and differential chemical composition, but once more the culinary appeal has not been explained. Why should the fat of an adult river fish create difficulties in digestion and lead to unpleasant eructations whilst the fat of sea fish is almost or completely free from these disabilities? The fat of sucking pig, to refer once more to Charles Lamb, is of a delicacy in taste unknown to the fat of pork. The unpleasant after-taste, especially in the palate, following the eating of ox heart can perhaps be referred to sterols, but could those investigators who expound the thermodynamics of contractile tissue with the aid of integral equations inform us what functions these sterols carry out in the cardiac cycle? Also by the way, cardiologists might be induced to tell us why the external wall of the ventricles is so often burdened with an investment of adipose tissue.

Wherein resides the special quality of venison? South Africans tell us that true biltong cannot be made from the flesh of domesticated animals. In the chemistry of cooking the gelatinization of connective tissue and the coagulation of certain proteins in animal foods and the bursting of starch grains and the softening of woody fibre in vegetable have been studied in detail, but the subtle changes in flavour produced by cooking are still outside the activities of experimental science. To a wild carnivore uncooked flesh must be exceedingly appetizing, but it is not attractive to a human being, at least a sane one. The act of cooking develops a highly flavoured complex to which the name osmazome was given in 1819—a word which has slipped out of biochemical usage. So animal flesh is roasted, grilled, fried, brazed and boiled, and a quite new series of flavours is evolved, to which, however, biochemical science has not as yet given any attention. In only a few vegetable foodstuffs does cooking produce intensification of existing flavours or development of new; an example is the mushroom. Bread also contains a something apart from added mineral matter which is missing in masticated wheat grain. Also a human being does not cheerfully eat a raw potato, but can find a well-cooked one attractive for something else than the physical changes which permit oral comminution and salivary admixture. Apart from cooking the vegetable contribution to our diet displays problems akin to the animal. The various edible vegetable

oils, olive, peanut, sunflower, maize, cottonseed, have all much in common, physically and chemically, but preferences can be found amongst consumers. Here it may be mentioned that in certain Mediterranean cities peanut oil can be seen being transferred open and unashamed from the oil factory to the sardine cannery. The consumer believes his sardines are cooked in olive oil, but if he cannot tell the difference and if the two oils are physiologically equal is he any the worse? Many scientific operations are directed towards wheat and the flour it produces, but the final test is the baking of a loaf and the reaction to this of a human consumer.

When we come to beverages we find that analytical chemistry can afford us information about the concentrations of sugar, alcohol, tannin and aldehydes, but the delicate flavours which give bouquet to wine and are a measure of maturation, are beyond the most refined methods of scientific detection and must be determined by the olfactory sense, degenerate as this is in the human being. Something goes wrong with Presbyterianism and whisky when they go south of the Tweed, and something goes wrong with Episcopacy and beer when they go north of the Tweed; the religious differences can possibly be attributed to race and especially tradition, but the subtle changes in the beverages elude all scientific instruments of precision. We see therefore that many of the qualities which are responsible for flavour cannot at present be detected or assessed by any procedure other than human sensory faculties; but there must be a number, especially those which have been mentioned in connexion with food-stuffs derived from animals, with which the biochemist ought to get busy.

Current Comment.

A PLEA FOR CONSERVATIVE TREATMENT IN PULMONARY TUBERCULOSIS.

THE pendulum swings, in medical progress no less than in other human affairs. At present, in the treatment of pulmonary tuberculosis, it has swung very far in the direction of active treatment, especially of surgical interference. Control by antibiotics makes it possible to attempt operations that would once have not even been contemplated. The physician as well as the surgeon has many weapons to use in his battle with "The Captain of the Men of Death"; these include antibiotics, artificial pneumothorax and pneumoperitoneum, phrenicectomy, and last but not least bed rest. Lasar Dunner and M. Sanger Hicks¹ hold that it is time to take stock of all this activity—to pause and reflect. They point out that spontaneous healing occurs far more frequently than many imagine, especially in certain types of tuberculosis. It is their general rule to delay active treatment if possible and not to use it unless there are definite indications for it. The institution of a pneumothorax involves continuation of refills for at least two years and is by no means free from the risk of complications. The discovery of antibiotics has been a great advance, but even here a word of warning is necessary. Streptomycin is not a harmless drug, and "Isoniazid" and its fellows are revealing their occasional dangers. The release of drug-resistant organisms is a calamity. Surgical procedures involve grave risks, though no one can doubt that excellent results have been obtained in suitable and carefully chosen cases. Sometimes, however, results of equal excellence have been

obtained in patients who have refused operation. Consider two case histories quoted by Dunner and Hicks.

"A young man was advised, in a sanatorium in the South of England, to undergo thoracoplasty, following an unsuccessful attempt at pneumothorax. He refused operation and returned home. Since his disease was recognized as a typical 'cavitation complex' he was put to bed. Complete healing occurred eventually and was maintained five years later."

Dunner and Hicks use the term "cavitation complex" for a group of cases "characterized mainly by thin-walled cavities without translucency and a hæmatogenous nodulation in the surrounding lung". The second case history is as follows: "A young man of 30 years with an obviously healed lesion in the right upper lobe showed small translucencies on tomogram. The physician referred him to a surgeon, who advised lobectomy, which was refused. He remained under observation and is well and working three years later."

Again operation, once performed, sometimes proves to have been unnecessary—rather a tragedy for the patient. Here is an instance: "A young woman of 28 years had tuberculosis in the left upper lobe which responded well to bed-rest and chemotherapy. In spite of absence of signs and symptoms a lobectomy was performed. Histological examination of the excised lobe revealed no evidence of active tuberculous disease."

The case for conservative treatment is supported by an editorial in the issue of *Tubercle* for December, 1952. The writer points out that, on reading the recent literature, one finds that equally good results are claimed by proponents of many different forms of treatment. "Is it possible", he asks, "that tuberculosis is not now the formidable enemy of past times, quite apart from new therapy? It may well be so, and at all events we can now undertake our widely varied procedures with an immeasurably greater margin than formerly." If this is so, which of us would not choose for himself, if he were the patient, the gentlest and safest of the various forms of treatment available? The picture, of course, is not entirely hopeful; there remain a number of obstinate and tragic cases resistant to all forms of treatment, but these are far fewer than formerly and some of them are those in which surgery has been unsuccessful. Another remarkable fact is that many patients with tuberculosis prove to be subjects of more or less deep emotional conflicts. What are the practical applications of this discovery, which in its own way is as important as that of the antibiotics to which *Mycobacterium tuberculosis* is sensitive?

Dunner and Hicks voice their plea for rational conservatism with gentleness and moderation, but they support it firmly with hard facts. All will agree with them that the initial treatment of every patient with tuberculosis should be controlled by the physician (as indeed it usually is in this country); that surgical opinion should not be sought until medical treatment proves inadequate; and that bed rest is of paramount importance, and will frequently reveal a tendency to spontaneous healing.

GUY'S HOSPITAL REPORTS.

MEDICAL LITERATURE now forms a considerable part of the mass of our medical knowledge, and indeed, may be regarded as a relief to our memories, which cannot carry the whole burden of even every day's mental activities. More than that, the young graduate with aspirations to become one of those authorities of the written word whom he today venerates and criticizes, strives to gain acceptance for his own articles in a widely read journal. Most of us sigh when we perceive the steady all-covering flood of medical literature inexorably bringing its fertilizing influence to our fatiguing husbandry. We feel that "of making many books there is no end" and wish for some means of reducing their number. Perhaps the answer lies in the recognition of the varying functions of medical journals. Let the ultra-specialist read in his esoteric

¹ *Tubercle*, October, 1952.

tongue, let him who likes variety and some painless instruction in the basic sciences and some news of his fellows read his own group periodical, and let the swallower of concentrated nutriment continue to ingest his microgrammes. There is still room for the periodical which serves the familiar wards wherein we learnt, and perchance still teach, whose articles may bring to us with but a brief interval of space or time a close welding of medicine's advances and the traditions of a school. Such is a journal which has weathered the storms of one hundred years, and still maintains the spirit and the reputation of that hospital founded in 1721 by Thomas Guy. Many Australians have trodden those rather gloomy streets and have been stimulated by the last few generations of distinguished teachers of this school, some of whom have come here to allow us to taste or to retaste the flavour of their tradition. R. C. Brock, the present editor, internationally well known, gives an interesting review of the years that have elapsed since the *Guy's Hospital Reports* were first published. Several other editors have filled this post for periods of a dozen years and more. The brilliant and forceful Hurst infused the same life into the journal as he did in his ward work, and remained in the editor's chair for nineteen years. The names of some of the contributors whose work enriched the pages of the reports over the last century are fascinating to read: Astley Cooper; Bright, who described his eponymic disease at Guy's; Addison, who did his work on suprarenal disease there; Hodgkin, almost equally well known; Taylor, still famous for his forensic medicine; Gull; Wilks, another great editor and medical pioneer; Chevers, who as well as Wilks described the condition now called Pick's disease; Arbuthnot Lane, who made some early contributions in anatomy, as did also Starling and Hopkins in the physiological field; Hale White, still a familiar name; Hurst, who placed the journal on a firm quarterly basis; Ryle, one of the beloved physicians; and Nicholson, whose great work on tumours has been appropriately edited by R. A. Willis. So the *Reports* reach their hundredth volume, and justify their vigorous continuance in the field of medical literature, if apology is needed. Maybe not all medical journals will survive; happily we have not to make the direct choice of which we will allow to sink, but while a periodical has those qualities that make us want to read it, or, better (let us hope), write for it, it will live.

THE HAEMODYNAMICS OF THE ANAESTHETIZED PATIENT.

IMPORTANT circulatory changes occur in patients subjected to major surgery under general anaesthesia. R. Shackman, G. I. Graber and D. G. Melrose¹ point out that it is recognized that haemorrhage, local fluid loss into traumatized tissue, anaesthesia and perhaps noxious nervous stimulation may each, in part, be responsible for the development of these changes, and they refer to the work of others who have investigated these individual factors. Their own main object, however, has been to present an overall picture of the circulatory adjustment which takes place during the course of major abdominal operations performed on patients under general anaesthesia. Their subjects were 32 adult patients, 18 male and 14 female, with an age range of thirty-one to eighty years and an average age of fifty-six years. Sedatives given, under the direction of the anaesthetists, were combinations of morphine, atropine and scopolamine. The anaesthetics used were combinations of "Pentothal", curare, cyclopropane, nitrous oxide and oxygen. The cardiac index, peripheral blood flow, blood pressure and overall resistance were determined at appropriate stages. The cardiac index was obtained by dividing the value of the cardiac output by the body surface area, deduced from the height and weight of the patient. Determination of the cardiac output involved cardiac catheterization of the patient. The peripheral blood flow was determined with a venous occlusion plethysmograph and the blood pressure by means of cuff

sphygmomanometry. The detailed results of the investigations are set out in the paper and compared with those of other investigators. We need refer here only to the general findings. These indicate that major circulatory adjustments begin as soon as general anaesthesia is induced and that practically half of the cardiac output very soon becomes distributed to the skin and musculature. This redistribution of blood has been found to occur usually in the presence of a slight fall in cardiac output and a virtually unchanged blood pressure; it is explained on the basis of profound vasodilatation of the blood vessels in the skin and muscle. It has also been deduced that compensatory vasoconstriction, most probably in the splanchnic bed, accompanies these early circulatory changes. Prolongation of anaesthesia and operation was found to be accompanied by yet further circulatory changes. In the late stage of operation, the figures for the blood flow in the skin and in the muscles decreased and returned approximately to the levels present in the pre-anaesthetic stage when the patient was under the influence of sedatives; at the same time the cardiac output fell appreciably in the majority of patients and rose in a small minority. Calculation of resistances in this late stage showed that overall vasoconstriction had developed in 72% of patients and overall vasodilatation in 19%; no change in overall resistance was found in the remaining 9%. It has been deduced that splanchnic vasoconstriction was still present in the late phase of operation in the major group of patients. The significance of the circulatory changes described may be profound, as Shackman, Graber and Melrose point out. Special interest attaches to the splanchnic vasoconstriction. It has been found by earlier workers that splanchnic vasoconstriction decreases the liver blood flow, and there is reason to believe that a direct relation exists between impairment of liver blood flow and function, and the development of irreversible shock. Evidence has been produced to show that varying degrees of liver dysfunction may occur in humans undergoing surgery under general anaesthesia, and it is possible that splanchnic vasoconstriction is partly responsible. These are matters for serious thought. Shackman, Graber and Melrose state that it is perhaps premature to deduce any practical applications from the results of their studies, but it is clear that excessive blood loss will accentuate the haemodynamic changes and prolonged operating time will increase their duration. It is equally clear that the effects of these haemodynamic changes need further investigation with a view to the drawing of definite conclusions. The suggested implications are much too important for the surgeon and the patient to be left in doubt.

POST-GRADUATE WORK AND THE EMPIRE MEDICAL ADVISORY BUREAU.

MEDICAL GRADUATES visiting the United Kingdom have been well provided for by the Empire Medical Advisory Bureau, established by the Council of the British Medical Association. This fine scheme is brought to mind again by the arrival of a new edition of the summary of regulations for post-graduate diplomas and of courses of instruction in post-graduate medicine, prepared by the Bureau. The summary contains a good deal of detail and will be helpful to anyone interested in post-graduate work in the United Kingdom. It contains information not only on post-graduate diplomas and courses of instruction, but also on hospital appointments and medical registration. Because of recent changes it is particularly important that practitioners going overseas with the intention of practising, even temporarily, should be fully informed on registration requirements, and they will do well to refer to this summary and, if necessary, seek the further advice of the Bureau. The Bureau can also help visitors in many other matters, including accommodation and private hospitality. All communications should be sent to Dr. H. A. Sandiford, M.C., D.P.H., Medical Director, Empire Medical Advisory Bureau, B.M.A. House, Tavistock Square, London, W.C.1.

¹ *Brit. J. Surg.*, November, 1952.

Abstracts from Medical Literature.

MEDICINE.

Myasthenia Gravis.

N. S. SCHLEZINGER (*J.A.M.A.*, February 16, 1952) discusses the present treatment of *myasthenia gravis*. He states that neostigmine is generally used: 30 milligrammes of neostigmine bromide are given orally three to five times daily. Ephedrine, 25 milligrammes two or three times daily, may also help. Potassium is useless in the doses required to produce effects (30 to 40 grammes daily). Tetraethylpyrophosphate is more toxic than neostigmine. Thymectomy is of doubtful value unless a tumour is visible. Corticotropin is of temporary benefit only.

Chronic Peptic Ulcer and Coronary Thrombosis.

L. M. MORRISON AND W. F. GONZALEZ (*Am. J. Med. Sc.*, September, 1952) found during examinations *post mortem* that infarction in the heart was present much more frequently in persons who had died from complications of peptic ulcer than in persons who had died from other acute or chronic diseases.

Respiratory Exercises for Emphysema.

W. B. ALLEN (*Am. J. Med. Sc.*, September, 1952) has found that the effort involved in respiratory exercises to promote upper abdominal and lower thoracic breathing rapidly can be developed into a natural and involuntary one. He has also found the exercises very beneficial to patients with emphysema.

Barbiturate Poisoning.

H. L. H. DICK (*Am. J. Med. Sc.*, September, 1952) concludes from an experience of 11 cases and a survey of the literature that amphetamine is the best analeptic drug for use in the treatment of severe barbiturate poisoning. At first a dose of 40 milligrammes was given intravenously, followed by 20 milligrammes every half-hour. It soon became evident that larger doses could be given safely and more effectively, so that doses up to 100 milligrammes every half-hour or every hour were administered.

Tuberculosis of the Kidney.

A. BRSKOW (*Acta tuberc. scandinav.*, Supplement 31, 1952) has studied the subsequent history of 228 persons who had been treated for renal tuberculosis between 1934 and 1943. The onset of complications, often after nephrectomy, supported the view put forward by early investigators that tuberculous epididymitis should be regarded as usually secondary to tuberculous prostatitis and vesiculitis, which in turn usually results from urogenous spread from the kidneys. There was reason to assume that the pelvic genital organs were already involved by tuberculosis in at least half of the patients, numbering 201, subjected to nephrectomy. The influence of coexistent pulmonary tuberculosis on the prognosis of renal tuberculosis was unfavourable; but the

mortality among those with signs of healed bone and joint tuberculosis was strikingly low. An analysis of 2655 cases of renal tuberculosis treated in Scandinavian countries between 1934 and 1943 showed that the results of treatment were not better than in the first two decades of the century as regards mortality, the frequency of cystitis and the healing of nephrectomy wounds, notwithstanding that diagnosis was generally made earlier and in one case out of every ten made in the sub-clinical phase. In more recent series of cases the invention of chemotherapy has reduced early mortality after operation.

Pulseless Disease.

W. C. CACCAMISE AND J. F. WHITMAN (*Am. Heart J.*, October, 1951) describe the case of a married white woman, aged nineteen years, suffering from pulseless disease. This disease, of which 58 cases have been reported, is characterized by loss of pulsation in the radial arteries, absence of detectable blood pressure in the arms and the progressive formation of cataracts and peripapillary arterio-venous anastomoses in the retina. The leading symptoms are syncope attacks and visual disturbances. The cause of the disease is believed to be thrombosis of the subclavian and carotid arteries due to panarteritis of unknown aetiology.

The Circulation in Severe Emphysema.

J. P. D. MOUNSEY *et alii* (*Brit. Heart J.*, April, 1952) found by catheterizing the hearts of persons with severe emphysema that in the absence of congestive failure the right ventricular systolic pressure was normal or only moderately raised, but that in the presence of failure it was raised in every case, returning towards normal with recovery from failure. Thus, pulmonary hypertension in heart failure from emphysema is reversible and cannot result solely from fixed anatomical changes in the vascular bed of the lungs. Cardiac glycosides in full doses caused a rise in the right ventricular pulse pressure without significantly altering the cardiac output.

Papilloedema and Meningeal Hydrops.

H. GILLER AND D. G. COGAN (*Arch. Ophthalm.*, November, 1952) describe meningeal hydrops and analyse seven cases. They state that meningeal hydrops is a clinical entity in which the intracranial pressure is increased without an expanding intracranial lesion or other obvious cause. Headache, blurred vision and bilateral papilloedema occur with clear cerebrospinal fluid, the pressure of which is raised. The condition has been variously named *pseudotumour cerebri*, *otitic hydrocephalus*, *intracranial hypertension of unknown cause*, *intracranial pressure without brain tumour*, *toxic hydrocephalus*, *serous meningitis*, *meningeal hydrops* and *arachnoiditis*. As a rule the onset is sudden and headache, blurred vision, dizziness, diplopia, nausea and vomiting occur. The papilloedema is bilateral and as a rule symmetrical. The duration may be weeks or years. The treatment has varied from simple observation to cranial decompression. Although the cause is not known, the weight of

evidence favours thrombosis of the superior longitudinal and/or the lateral sinuses as the cause. In the cases described the treatment consisted of repeated lumbar punctures. However, the efficacy of treatment is difficult to evaluate because the natural course of the disease is one of spontaneous remission.

"Antabuse" and Alcoholism.

R. C. LARIMER (*J.A.M.A.*, September, 1952) describes the procedure adopted at a clinic in Montreal for treatment with "Antabuse" (tetraethylthiuram disulphide). He claims that 76% of patients followed up were rehabilitated and that this compares favourably with other forms of therapy. Patients are treated as out-patients, and share in the therapeutic sport of an "experience session", at which they partake of their favourite alcoholic beverage after pre-treatment with "Antabuse". The reactions they experience at this organized drinking clinic, enhanced by watching the others, form a deep and lasting impression on them and discourage them from drinking in the future. The reactions are frequently frightening even to the sober observer—flushing, shock, collapse, dyspnoea, headache, vomiting, twitching—but can be aborted at any time by ascorbic acid or intravenous administration of iron. Sensitivity increases, apparently, till some patients react to even one fermented grape. The indication for treatment is a willing alcoholic; contraindications are diabetes, arteriosclerotic cardiovascular disease, hepatic and biliary disease, and potential schizophrenia.

Aureomycin and Mumps.

LEROY HOMER AND W. N. DONOVAN (*J.A.M.A.*, September, 1952) found no beneficial effect from the administration of aureomycin in cases of mumps. They gave the drug to 24 patients, and compared the results with those in an identical group treated without the drug.

ACTH and Cortisone in Agranulocytosis and Thrombocytopenic Purpura.

M. VIRKKUNEN (*Arch. Int. Med.*, November, 1952) describes the effects of treatment of two cases of agranulocytosis due to thiosemicarbazone, and two cases of thrombocytopenia following gold therapy. In the first two cases, recovery commenced immediately ACTH therapy was begun, and became complete. Temporary remission occurred in one case of thrombocytopenia with cortisone therapy; administration of ACTH caused no rise in the number of platelets in the other, but the bleeding tendency was temporarily prevented.

Viral Hepatitis.

J. D. FARQUHAR *et alii* (*J.A.M.A.*, July 12, 1952) describe an epidemic of viral hepatitis, apparently spread by drinking water and by contact. They state that the virus of epidemic hepatitis is present in the stools of infected persons. Whether cross-infection results from this source alone, or from the urine or nasopharyngeal infection, is still unknown. Spread by insect bites seems unlikely. Spread by drinking water is established, and milk and food may convey the infection. Twenty-two cases are recorded here, occurring in an isolated rural area of Pennsylvania.

Fever, anorexia, nausea, vomiting, abdominal distress or pain, dark urine, jaundice and an enlarged tender liver were noted. The stools were often light-coloured. The illness lasted two to four weeks, and all patients recovered. Well water was used in this community. The water showed the presence of coliform organisms in excess. Spread by personal contact was evident. The incubation period was thirty-four days in contact infections, and forty-six days in apparently water-borne infections. The origin of infection was from a well which was fecally contaminated. The infection was apparently spread by drinking water and by contact.

Acute Peptic Ulcers.

E. G. WOLDMAN (*J.A.M.A.*, July 12, 1952) discusses acute peptic ulcers. He states that post-mortem studies in 1000 consecutive cases at St. Luke's Hospital, Cleveland, showed mucosal hemorrhages, erosions and acute ulcers quite frequently in the esophagus, stomach and duodenum. These lesions occurred in subjects at all ages, but most often in those between twenty-one and thirty years of age, and thirty-one and forty years of age. The lesions occurred most often when death was post-operative, but also frequently when it resulted from cardio-vascular disease, pulmonary disease, malignant disease and cerebral lesions. Burns, shock and severe injuries were associated with ulcers. Changes in the adrenal glands were found in up to 70% of these cases. Congestion, round-cell infiltration, hemorrhage or necrosis, tuberculosis, leucemic infiltrations and tumour metastases were common findings in the adrenal glands in these conditions.

Treatment of Hypertension.

L. C. MILLS AND J. H. MOYER (*Arch. Int. Med.*, November, 1952) gave two types of oral preparation of extracts of *veratrum viride* to 61 patients suffering from hypertension. The blood pressure was reduced in a few cases, but therapeutic results were inferior to those obtained with hexamethonium.

S. W. HOEBLER *et alii* (*Ann. Int. Med.*, September, 1952) report the results of treatment with a purified derivative of *veratrum album* which they claim is superior to the alkaloids of *veratrum viride*. By an intermittent oral dosage schedule they obtained substantial reduction of blood pressures throughout most of the day. They claim that the side effects of nausea and vomiting, a disadvantage in the *viride* derivative, could be avoided in most patients. The treatment is palliative and not curative.

Observations on the Splenic Flexure Syndrome.

THOMAS E. MACHELLA *et alii* (*Ann. Int. Med.*, September, 1952) record details of a syndrome of chest pain in 40 patients, due, in their opinion, to location of air in the splenic flexure. Fluoroscopy during attacks of pain revealed collections of gas in this region, and the same pain could be caused by inflation of a balloon introduced into this site. The pain occurred generally in the upper left quadrant of the abdomen, the left flank, the precordium, shoulders and neck, and other less common sites. Often more than one area was affected. The pain was

mostly described as pressure, fullness, distension or ache. Its severity was not usually great. Emotional factors were prominent in causation. Relief came from passage of flatus or feces. The distal transverse colon and descending colon formed a very acute angle in most cases. The authors consider the syndrome to be a variation of spastic colon and to be important in the differential diagnosis of coronary disease.

Human Albumin Infusions and Homologous Serum Jaundice.

R. S. PAINE AND C. A. JANEWAY (*J.A.M.A.*, September 20, 1952) state that it has been the impression of many observers that the intravenous administration of albumin instead of serum reduces the incidence of homologous serum jaundice. Workers with known infected pooled plasma have considered that the heating necessary during the preparation of the albumin is enough to destroy the virus. The authors analyse the records of 237 patients, dividing them into a group that had received albumin only and a group that had, in addition, received blood or plasma. There were no cases of jaundice in the first group, and two in the second. They concluded that these results were significant.

Penicillin Treatment of Cardio-Vascular Syphilis.

H. BEERMAN (*Am. J. Med. Sc.*, October, 1952) reviews reports published to date on the dangers and the effectiveness of penicillin therapy in cardio-vascular syphilis. He lists the following main points: (i) penicillin is not dangerous; (ii) it is an effective treatment, which influences the disease favourably to the patient; (iii) it should be given early in full doses; (iv) little or no change should be expected in the serological tests. He summarizes all the cases which have been reported and concludes that Jarisch-Herxheimer reactions are exceedingly rare and that some which have been reported as such are open to criticism. He believes that penicillin is the safest agent yet produced for the treatment of this form of syphilis.

Triethylene Melamine and Polycythaemia Vera.

N. ROSENTHAL AND R. L. ROSENTHAL (*Arch. Int. Med.*, September, 1952) describe the results of treatment with triethylene melamine in 30 cases of polycythaemia vera. They state that quite good responses were obtained in practically all cases, but especially in those with a short history and normal white cell and platelet counts. The drug is given by mouth in doses of 2.5 or 5.0 milligrammes every one to three days to a total of 15 to 40 milligrammes. Careful haematological control is necessary. It would appear to have no great advantage or disadvantage over other forms of treatment.

Prognosis of Angina Pectoris.

W. J. BLOCK *et alii* (*J.A.M.A.*, September, 1952) report the results of follow-up studies of 6882 patients with angina pectoris examined at the Mayo Clinic from 1927 to 1944. The minimum follow-up period was five years. The ratio of males to females decreased with age, but overall was four to one. The average age at diagnosis was 58.5 years for males and 60.1 for females,

and the average duration of symptoms was 2.5 years. Mortality was 15% in the first year, and about 9% in each succeeding year; 58.4% of subjects survived five years or more (compared with 86.9% for normal persons) and 37.1% for ten years (70.4% normal). The prognosis was worse when the electrocardiogram showed abnormalities, especially conduction disorders. Of associated conditions, malignant disease and diabetes increased mortality most, thyroid disease, duodenal ulcer and gall-bladder disease increased it slightly. A surprising and unexplained finding was a more favourable prognosis in patients who were obese.

Impending Hepatic Coma and Certain Nitrogenous Substances.

G. B. PHILLIPS, R. SCHWARTZ *et alii* (*New England J. Med.*, August 14, 1952) state that the serious complication of severe liver disease is coma, which is often irreversible. Its onset is difficult to predict. However, clinical observation has shown that mental disturbances and a characteristic tremor often occur prior to the coma. A characteristic electroencephalographic pattern often occurs. This syndrome has been produced in patients with severe advanced cirrhosis of the liver by certain ammonium-containing cation-exchange resins, the reaction apparently being related to the ammonium ion. The authors have produced an identical picture by the administration of ammonium chloride and ammonium nitrate. Although the untoward reaction was reversible in every case, and the liver damage was not increased, they suggest that the exhibition of ammonium-containing substances to patients with severe liver disease may be hazardous.

Hypertrophic Pulmonary Osteoarthropathy Simulating Rheumatoid Arthritis.

H. A. FRANK (*New England J. Med.*, August 21, 1952) states that hypertrophic pulmonary osteoarthropathy is commonly mistaken for arthritis. The X-ray findings are, however, quite different. The distinction is important because of the usual association of the arthropathy with carcinoma of the lung and the fact that it may antedate the pulmonary symptoms.

The Prevention of Thrombo-Embolism in Acute Coronary Artery Disease.

D. LITTMAN (*New England J. Med.*, August 7, 1952) employed anticoagulation therapy only in patients with evidence of extensive myocardial injury (44 cases). The remainder of the patients (112 cases) received no anticoagulants. All were encouraged to move freely about in bed and to wash, shave and feed themselves. The large majority were ambulatory in two to three weeks. The mortality among the patients not receiving anticoagulants was 42%; that among the treated patients was 16%. The patients receiving anticoagulants had a higher incidence of thrombo-embolism. The author concluded that anticoagulants should be used only for patients with extensive myocardial infarction who show evidence of failure, shock and intractable pain, and may be expected to be in bed for a long time if they recover.

Public Health.

REPORT BY THE SPECIAL MEDICAL COMMITTEE INVESTIGATING MATERNAL MORTALITY: MATERNAL DEATHS IN THE METRO- POLITAN HEALTH DISTRICT OF SYDNEY, 1944 TO 1949.

THE Special Medical Committee Investigating Maternal Mortality, which was appointed by the Minister for Health in 1939, has prepared the report of its findings for the six years 1944 to 1949. An earlier report of the findings of the committee was published for the years 1939 to 1943 (see THE MEDICAL JOURNAL OF AUSTRALIA, December 10, 1944, page 688).

The personnel of the committee is now as follows: the Director-General of Public Health, Dr. H. G. Wallace; Professor B. T. Mayes; Emeritus Professor F. J. Browne; Dr. T. Dixon Hughes, Honorary Medical Officer, Women's Hospital, Crown Street; Dr. T. H. Small, Honorary Medical Officer, Royal Hospital for Women; Dr. E. A. Tivey, representing the British Medical Association; and Dr. Grace Cuthbert, Director of Maternal and Baby Welfare (secretary).

The case histories for consideration by the committee are prepared by officers of the Division of Maternal and Baby Welfare from replies to questionnaires sent to the medical practitioners concerned, from reports obtained from the medical superintendents of public obstetric hospitals, and from reports made by medical officers of the division and by supervisory nurses. All material is kept strictly confidential to the committee; no lay person is present at the meetings. The strict observance of the confidential nature of the information made available to the committee is regarded as essential in the maintenance of the valuable cooperation of medical practitioners, without which the work of the committee would be ineffective.

THE SCHEME FOR THE REDUCTION OF MATERNAL MORTALITY.

The committee is part of a scheme for the reduction of maternal mortality inaugurated in January, 1939, by the Department of Public Health of New South Wales as a result of consultations with the New South Wales Branch of the British Medical Association on high maternal mortality rates then prevailing. A survey of maternal deaths throughout the State of New South Wales by departmental officers revealed that a high proportion of these deaths was preventible.

TABLE I.

Maternal Mortality Rates in New South Wales per 1000 Live Births, 1920 to 1949.

Years.	Number of Deaths.	Years.	Number of Deaths.	Years.	Number of Deaths.
1920 to 1924	5.39	1941	4.04	1946	1.65
1925 to 1929	5.79	1942	3.97	1947	1.87
1930 to 1934	5.93	1943	3.42	1948	1.37
1935 to 1939	5.30	1944	3.12	1949	1.37
1940	4.23	1945	2.25		

Other Provisions Under the Scheme.

The scheme during the years under review (1944 to 1949) was limited to the metropolitan health district of Sydney, and embraced the following facilities:

1. A free consultant service. A panel of obstetric consultants will provide full service for any patient who is unable to pay a consultant's fee. Medical practitioners may call any of the consultants on the panel, each of whom has consented to receive a reduced fee from the department. The service is now available during pregnancy as well as at the time of confinement and in the puerperium. The request is made by the doctor directly to any consultant at any time.

2. Mobile blood transfusion units. These can be called at all times from the Women's Hospital, Crown Street, the Royal Hospital for Women, the Royal Prince Alfred Hospital, the Royal North Shore Hospital and St. George's Hospital. In addition, plasma is always available at a number of selected hospitals, for use pending the arrival of the mobile unit. This service is made possible by the cooperation of these hospitals and of the Red Cross Society with the department.

3. A free bacteriological service in cases of puerperal fever. This is available at the microbiological laboratory in

the department for those mothers unable to meet such costs. The object of this service is to provide early diagnosis of the nature of the organism causing infection, in order to facilitate the correct choice of therapeutic agent and its use at the earliest possible moment.

4. Suburban pre-natal clinics. Twelve pre-natal clinics are conducted by departmental medical officers at certain baby health centres in Sydney. These services are located at centres remote from public maternity hospitals, so that expectant mothers can receive adequate pre-natal care in their own districts. Each mother is booked at her own hospital, where her thoracic X-ray examination, blood count, blood grouping, investigation for the Rh factor and Wassermann test are completed. So close is the liaison with the hospitals concerned that these clinics are in fact local out-patient departments. Trained dietitians from the department visit these clinics and advise the mothers on their food problems, particularly in cases of toxæmia. The mothers attending these clinics are saved much fatigue in travelling, long hours of waiting, anxiety over the minding of other children, and expense for the cost of fares and food while absent from their own suburbs.

5. Free booklet. A free booklet called "Healthy Motherhood" is published for use by all medical practitioners in the care of their patients.

6. Physiotherapy in obstetrics. A film in sound and colour on "Physiotherapy in Obstetrics" for the training of medical students, physiotherapists and nurses is available. This sets out the latest advice on ante-natal exercises and relaxation therapy with demonstrations by expectant mothers.

Births, Stillbirths and Maternal Deaths.

In Tables IIa and IIb are set out the births, stillbirths and maternal deaths in New South Wales and in the Metropolitan Health District.

METHOD, PURPOSE AND SCOPE OF THIS REPORT.

The present report is based on the committee's investigations of all maternal deaths in the metropolitan health district of Sydney in the six years from 1944 to 1949 inclusive; 595 deaths associated with pregnancy or childbirth were examined. The report refers to 374 which were classified as due directly to pregnancy or childbirth.

It is considered by the New South Wales committee that the free discussion at the meetings between medical practitioners only and the confidential treatment of the material have encouraged the cooperation of the doctors in Sydney and made the findings of the committee more accurate.

The purpose of the continuing investigation is to ascertain whether any additional measures should be taken to reduce maternal deaths, or what additional facilities should be provided.

When deaths are considered to be due to any fault on the part of the doctor or hospital, the committee approaches those concerned by letter from the Director-General or by the personal contact of the medical secretary, to ensure that there is no error in the assessment of any preventable factors, or that the fault will not recur from lack of appreciation of the committee's finding. This, of course, applies particularly to cases in which weight and blood pressure are not regularly used as assessments in the care of toxæmic patients, and to those cases in which the doctor has failed to seek the advice of a consultant.

The scope of the investigation is to assist in the accurate classification of the causes of death, and to ascertain whether there are any avoidable factors leading up to the death of the mother. These factors are assessed under the following headings: (i) error in judgement or in management on the part of the doctor or hospital; (ii) omission or inadequacy of ante-natal care on the part of the doctor or hospital; (iii) negligence or lack of cooperation on the part of the mother or her relatives; (iv) lack of, or failure to use, reasonable facilities.

PREVENTIBLE DEATHS: PRIMARY AVOIDABLE FACTORS.

To assess the case histories in a comparable manner, the committee followed the practice of tabulating the preventable deaths according to the primary avoidable factor—that is, the first deviation from a reasonable standard of obstetric practice, or the lack of cooperation of the mother in the pre-natal period.

A death was included in the non-preventible group when the committee considered that reasonable skill and care had been given during pregnancy and in the conduct of labour, and that the mother had sought pre-natal care and obeyed instructions, and that her home surroundings, diet and general health had been satisfactory. The total number

TABLE IIA.
Births, Stillbirths and Maternal Deaths in New South Wales, 1936 to 1949.

Year.	Number of Live Births.	Live Births: Rate per 1000 of Population.	Number of Stillbirths.	Rate per 1000 Total Births.	Live Births and Stillbirths, Total Number.	Number of Maternal Deaths.	Maternal Deaths: Rate per 1000 Live Births.
1936	46,193	17.31	1,419	29.80	47,612	292	6.32
1937	47,497	17.62	1,452	29.66	48,949	233	4.91
1938	47,319	17.38	1,473	30.19	48,792	231	4.88
1939	48,003	17.45	1,360	27.55	49,363	200	4.17
1940	49,382	17.78	1,342	26.46	50,724	209	4.23
1941	51,729	18.47	1,464	27.52	53,193	209	4.04
1942	52,647	18.60	1,411	26.10	54,058	209	3.97
1943	57,265	20.04	1,465	24.94	58,730	196	3.42
1944	59,612	20.65	1,511	24.72	61,123	186	3.12
1945	61,662	21.14	1,540	24.37	63,202	139	2.25
1946	67,247	22.83	1,547	22.49	68,794	111	1.65
1947	69,398	23.25	1,466	20.69	70,864	130	1.87
1948	67,234	22.19	1,326	19.34	68,560	92	1.37
1949	68,512	22.10	1,279	18.25	70,091	94	1.37

assigned as maternal deaths for these years was 374, and of these 185 were preventable.

Of the 101 deaths occurring in the gestation period before twenty-eight weeks, 79 were due to criminal abortion, all of which were classed as preventable. Of the 273 deaths occurring in the gestation period over twenty-eight weeks, 106 were regarded as preventable.

Errors of Judgement or in Management.

Errors of judgement or in management on the part of the doctor or hospital were responsible for 57 deaths. These errors included lack of recognition of disproportion in *primigravidae*, failure to give sufficient consideration to histories of abnormal labours in *multiparæ*, and untimely or unskilled interference. These also include cases in which the committee considered that a consultant's opinion should have been sought earlier, or in which a medical practitioner had failed to assess the degree of toxæmia and so to institute proper treatment. These 57 deaths were distributed as follows:

1944	..	..	..	16 (2 followed Cæsarean section)
1945	..	..	..	9 (2 followed Cæsarean section)
1946	..	..	..	9 (1 followed Cæsarean section)
1947	..	..	..	9 (4 followed Cæsarean section)
1948	..	..	..	8 (2 followed Cæsarean section)
1949	..	..	..	6 (0 followed Cæsarean section)

Of the total of 57 deaths, 11 followed Cæsarean section.

Omission or Inadequacy of Ante-Natal Care.

Omission or inadequacy of ante-natal care on the part of the doctor or hospital resulted in six deaths as follows:

1944:	one case (the patient was a <i>primigravida</i>).
1945:	one case (the patient was a <i>multipara</i>).
1946:	nil.
1947:	three cases (two patients were <i>multiparæ</i> , one was a <i>primigravida</i>).
1948:	one case (the patient was a <i>primigravida</i>).
1949:	nil.

Of the six patients who died, three were *multiparæ* and three *primigravide*.

This group includes errors in diagnosis and treatment, because in many cases it was found that the doctor had not

at any time recorded the patient's blood pressure or weight, and in some cases had examined the urine only occasionally. In these circumstances the onset of the toxæmia was unsuspected and suitable treatment was not instituted.

The committee noted that in these cases of death from toxæmia the family history had not been taken, and that any history of cardio-renal disease, of nephritic or cerebral catastrophes in the patient's family was therefore unknown.

The failure to recognize the importance of a rise in diastolic blood pressure, to take the family history or to regard an abnormal increase in weight as an early sign of toxæmia was regarded by the committee as contributory to the fatal issue in these cases.

Negligence or Lack of Cooperation on the Part of the Mother or Her Relatives.

In some cases of negligence, the mother had failed to seek early pre-natal care. In other instances she had not carried out the instructions given by the doctor, or had failed to report for further examinations either from carelessness or because in some instances she was discouraged by her relatives. There were 42 cases, as follows:

1944:	13 cases (5 patients were <i>primiparæ</i> , 8 were <i>multiparæ</i>).
1945:	4 cases (2 patients were <i>primiparæ</i> , two were <i>multiparæ</i>).
1946:	3 cases (one patient was a <i>primipara</i> , two were <i>multiparæ</i>).
1947:	8 cases (4 patients were <i>primiparæ</i> , 4 were <i>multiparæ</i>).
1948:	8 cases (2 patients were <i>primiparæ</i> , 6 were <i>multiparæ</i>).
1949:	6 cases (2 patients were <i>primiparæ</i> , 4 were <i>multiparæ</i>).

Lack of or Failure to Use Reasonable Facilities.

In some instances available facilities were not used, and this has been regarded as the primary avoidable factor in deaths such as those from hæmorrhage, when the mobile transfusion units had not been called, and when the com-

TABLE IIB.
Births, Stillbirths and Maternal Deaths in Metropolitan Health District.¹

Year.	Number of Live Births.	Live Births: Rate per 1000 of Population.	Number of Stillbirths.	Rate per 1000 Total Births.	Live Births and Stillbirths, Total Number.	Number of Maternal Deaths.	Maternal Deaths: Rate per 1000 Live Births.
1936	19,037	14.41	632	32.13	19,669	140	7.35
1937	19,539	14.70	623	30.90	20,162	102	5.22
1938	19,936	14.93	640	31.10	20,576	113	5.67
1939	20,599	15.28	604	28.35	21,203	96	4.64
1940	21,354	15.66	618	28.13	21,972	90	4.21
1941	23,931	17.15	693	28.14	24,624	91	3.80
1942	24,850	17.33	665	26.06	25,515	94	3.78
1943	28,728	19.44	752	25.51	29,480	89	3.10
1944	30,270	19.92	754	24.30	31,024	99	3.27
1945	31,629	20.38	782	24.13	32,411	63	1.99
1946	34,261	21.73	755	21.56	35,016	45	1.31
1947	34,788	21.71	676	19.06	35,464	50	1.44
1948	33,082	20.33	615	18.25	33,697	45	1.36
1949	33,295	19.73	594	17.53	33,889	39	1.17

¹ Figures represent births to, and deaths of, residents of the Metropolitan Health District who died in New South Wales.

mittee considered that a blood transfusion would have saved the mother's life. In other cases shortages of hospital beds have been regarded as a contributing factor, particularly when it was considered that mothers suffering from toxæmia had not been closely observed in hospital.

CLASSIFIED CAUSES OF MATERNAL DEATHS RELATING TO PREGNANCY, CHILDBIRTH AND THE PUERPERIUM.

The following classification is given of the causes of maternal deaths relating to pregnancy, confinement and the puerperium:

- I. Toxæmias: (a) eclampsia ("albuminuria" and nephritis), (b) other toxæmias.
- II. Hæmorrhage: (a) *placenta prævia*, (b) accidental hæmorrhage, (c) post-partum hæmorrhage.
- III. Infection.
- IV. Ectopic gestation.
- V. Cæsarean section.
- VI. Other obstetrical operations.
- VII. Abortions.

TOXÆMIA OF PREGNANCY, CHILDBIRTH AND THE PUERPERIUM.

The first group comprises deaths from (a) eclampsia, "albuminuria" and nephritis, and (b) acute yellow atrophy of the liver, *hyperemesis gravidarum* and other toxæmias of pregnancy and the puerperium up to three months after childbirth. The cases in this group number 111; toxæmia is one of the major causes of death.

Eclampsia, "Albuminuria", and Nephritis of Pregnancy and the Puerperium.

Approximately 50% of the deaths in the eclampsia, "albuminuria" and nephritis group occurred amongst *primiparæ*.

In most of the preventible cases the primary avoidable factor was lack of or inadequate pre-natal care. In 45 of the 91 deaths occurring in this group death was regarded as being preventible.

The defective pre-natal care was due in some cases to lack of cooperation on the part of the patient or her relatives, in others it was the fault of the medical attendant, and in some both factors were contributory to the fatal issue.

TABLE III.
Toxæmias.

Year.	Preventible.	Non-Preventible.	Total.
1944	12	16	28
1945	7	11	18
1946	6	11	17
1947	11	7	18
1948	8	9	17
1949	9	4	13
Total ..	53	58	111

Deficiencies.

The main deficiencies in pre-natal care on the part of the medical attendant were the following: (a) The repeated omission of the weight record, which in many cases may have been the earliest indication of the toxæmic state. (b) The omission in some cases of the blood pressure recording, including the record at the first visit. (c) The failure to regard as a definite sign of toxæmia a systolic blood pressure which had risen more than 20 millimetres of mercury, or a diastolic pressure which had risen 10 millimetres of mercury. (d) The lack of adequate treatment for the rising blood pressure. (e) Failure to recommend the patient's admission to hospital when albumin was found in a catheter specimen of urine or to take appropriate measures which might include admission to hospital when the systolic blood pressure had risen. (f) Failure to realize that albuminuria was only a late sign of toxæmia. (g) Failure to insist on a period of rest and careful observation for twenty-four to forty-eight hours in hospital with appropriate treatment before proceeding with the induction of labour. (h) Dis-

charging from hospital, before delivery, a patient who had been admitted with pre-eclamptic toxæmia, especially if she had had albuminuria at any time.

Case Histories Indicating Primary Avoidable Factors.

The following clinical histories indicate error in judgement on the part of the doctor or the hospital.

CASE 55.—A *primigravida*, aged twenty-eight years, had attended her doctor regularly for pre-natal care. In the fourth and fifth months of pregnancy she gained excessively in weight and the blood pressure was raised. At the seventh month oedema of the face, hands and feet developed, with slight albuminuria and a blood pressure of 135 millimetres of mercury, systolic, and 75 millimetres, diastolic. The patient was sent home to rest in bed for one week on a salt-free and meat-free diet, after which the oedema and albuminuria cleared; but the blood pressure continued to rise to 140 millimetres of mercury, systolic, and 80 millimetres, diastolic. Her diet was increased, and two weeks later she developed a sudden abdominal pain and some oedema of her face and hands. Her blood pressure was found to be 185 millimetres of mercury, systolic, and 120 millimetres, diastolic, and her urine contained "one-third" albumin. Arrangements were then made for her admission to a public hospital, but two hours later hæmorrhage began, and shortly afterwards she had a fit. She was then moved to hospital, but had two further fits. Labour began, and she was delivered by forceps of a macerated fetus. Her condition grew worse, and she died four hours after delivery.

In the opinion of the committee this patient should have been admitted to hospital at the seventh month, when she had raised blood pressure and albuminuria. Instead she was sent home to bed.

CASE 48.—The patient, a *primigravida*, aged twenty-three years, had attended regularly for pre-natal care from the sixth month; her weight gain was excessive. Her systolic blood pressure was 130 millimetres of mercury; the diastolic reading reached 90 millimetres on more than one occasion. During the seventh month there was slight oedema of the legs, and the blood pressure reached 140 millimetres of mercury, systolic, and 105 millimetres, diastolic, the urine still being free of albumin. She was not seen until fourteen days after this, when she was admitted to hospital, with a blood pressure of 190 millimetres of mercury, systolic, and 110 millimetres, diastolic, and "one-third" albumin in the urine. The same evening she complained of abdominal pain and vomited, and her blood pressure was 210 millimetres of mercury, systolic, and 120 millimetres, diastolic. Morphine and paraldehyde were administered, but the following morning the patient became restless, and the urine was blood-stained and "solid" with albumin. She had what appeared to be a fit and died forthwith.

In the opinion of the committee this patient should have been admitted to hospital at the seventh month, when oedema was present and the systolic and diastolic pressures were raised, although there was no albuminuria.

CASE 84.—The patient, a *primigravida*, aged twenty years, had attended regularly for pre-natal care at the out-patient department of a hospital. Her urine and weight recordings were satisfactory, but her blood pressure had always been raised, especially the diastolic readings, which had reached 120 millimetres of mercury on more than one occasion. In the eighth month the patient complained of severe headache, and was admitted to hospital with a blood pressure of 145 millimetres of mercury, systolic, and 120 millimetres, diastolic. She remained in hospital for five days under observation, but her health improved and she was discharged. Ten days later the husband was awakened by his wife, who had a "kind of a fit" at 4 a.m. A doctor examined her at 4.20 a.m., when she was unconscious, and she died half an hour later undelivered, without regaining consciousness.

The committee considered that this patient should not have been discharged from hospital when she had been admitted for severe pre-eclamptic toxæmia.

CASE 91.—The patient was an elderly *primigravida*, aged forty-one years. She had attended hospital regularly for ante-natal care, but had not been weighed. According to the history, her pregnancy had been normal until six weeks before term, when her urine contained a trace of albumin and her blood pressure was 160 millimetres of mercury, systolic, and 100 millimetres, diastolic. She was sent home to bed, told to take a fluid diet, and examined regularly three times a week. The albuminuria continued, and her blood pressure varied from 170 to 200 millimetres of mercury, systolic, while the diastolic pressure remained at 100 millimetres. Labour began two weeks prematurely, and she was

delivered of a stillborn child. Shortly after delivery the patient complained of blurred vision, and this was followed by a fit and general collapse. Morphine and cardiac stimulants were administered and the patient's condition improved slightly, but she collapsed and died suddenly within four hours.

In the committee's opinion this patient should have been admitted to hospital instead of being sent home to bed.

CASE 45.—This patient, a *primipara*, aged nineteen years, had attended regularly for ante-natal care, but was not weighed. Her urine and blood pressure were normal until the eighth month, when she developed oedema of the hands and feet. The oedema persisted, and fourteen days later the urine contained a cloud of albumin. A fortnight later the oedema was much more pronounced; albuminuria was still present, the blood pressure was 130 millimetres of mercury, systolic, and 80 millimetres, diastolic. Eleven days after this the patient was admitted to hospital with increasing oedema, severe headaches and almost complete anuria. Her blood pressure was 200 millimetres of mercury, systolic, and 160 millimetres, diastolic, and she was in labour and having strong contractions. Three hours later a fit occurred and the patient died shortly afterwards. A stillborn infant was immediately delivered by low forceps operation.

In the committee's opinion the albuminuria, if noticed in a catheter specimen of urine, should itself have indicated the patient's immediate admission to hospital, especially with a blood pressure of 130 millimetres of mercury, systolic, and 80 millimetres, diastolic, in a girl of nineteen years, and oedema of the hands. The following clinical histories indicate omission or inadequacy of pre-natal care, the fault of the doctor or hospital.

CASE 13.—An unmarried girl, aged eighteen years, was admitted to a child welfare shelter and found to be four or five months pregnant. On examination of the patient, both her blood pressure and her urine were normal. Monthly examinations were made until the seventh month, when the urine contained a cloud of albumin, and hypertension became manifest (systolic blood pressure 140 millimetres of mercury, diastolic pressure 99 millimetres). The patient also complained of puffiness of her ankles. She was sent by her doctor to the out-patient department of a public hospital, and was not admitted, but was sent home. Three days later her symptoms became more acute; the oedema increased and the urine contained "half" albumin. The patient was immediately sent into hospital, where her blood pressure was found to be 150 millimetres of mercury, systolic, and 110 millimetres, diastolic. Labour was induced by rupture of the membranes, but the patient had a fit as soon as labour began and another one and a half hours later. She became comatose and died the following day.

In the opinion of the committee, because of albuminuria and raised blood pressure this patient should have been admitted to hospital when she was first sent to the hospital's out-patient department, instead of being sent home.

CASE 56.—The patient was pregnant for the seventh time, and lived some distance from her doctor. She was aged twenty-eight years. No weight recordings or blood pressure estimations were made during the pregnancy, though her doctor examined her urine fortnightly. Her first child had been delivered by Caesarean section, on account of "kidney trouble", but the remaining pregnancies were said to have been normal. The patient's delivery date was doubtful, but about term the doctor was called in on account of a hæmorrhage. She was admitted to hospital immediately, where her urine was found to contain "three-quarters" albumin. She was shocked and restless, her blood pressure having fallen to 114 millimetres of mercury, systolic, and 70 millimetres, diastolic. There was oedema of her hands and legs, and the uterus was hard and tense. Shortly afterwards the membranes ruptured and she was delivered of a stillborn infant. The placenta was expelled shortly and showed the characteristic appearances of concealed accidental hæmorrhage. Two blood transfusions were administered to the patient and her condition appeared to improve; but on the sixth day of the puerperium she collapsed and died. She had passed very little urine in the puerperium, and her blood urea level was raised to 98 milligrammes per centum.

In the committee's opinion blood pressure estimation would have revealed that this patient had chronic vascular hypertension and therefore required very special care.

CASE 10.—The patient, a *multipara*, aged thirty-seven years, had a history of kidney trouble in her last pregnancy two years before. At the third month her blood pressure was 160 millimetres of mercury, systolic, and 100 millimetres, diastolic, and her urine was normal. She was examined at monthly intervals, and at the fifth month she

had gained one stone in weight and her blood pressure was 170 millimetres of mercury, systolic, and 100 millimetres, diastolic. She was given a diet, but was not examined again for three months, when her blood pressure was 190 millimetres of mercury, systolic, and 100 millimetres, diastolic, and she was put to bed and given a diet. Her blood pressure stayed high, though the urine was normal until early in the ninth month, when, with a blood pressure of 190 millimetres of mercury, systolic, and 100 millimetres, diastolic, she had a fit. She was at once sent to hospital in a semi-comatose condition, where she had two further fits and developed acute pulmonary oedema, from which she died undelivered twelve hours after her admission to hospital.

In the opinion of the committee this patient had a severe degree of chronic hypertension requiring very special care. At the fifth month, when her weight had increased by 14 pounds and her blood pressure was recorded as 170 millimetres of mercury, systolic, and 100 millimetres, diastolic, she should have been admitted to hospital. Instead she was left for three months without having been examined. Her condition at that time was very serious, but even then she was not sent to hospital, where the question of induction could have been considered.

CASE 25.—The patient, aged thirty-five years, had a history of one normal confinement. She had attended regularly for ante-natal care and was found to be gaining weight excessively. Her blood pressure at twenty-four weeks was 140 millimetres of mercury, systolic, and 90 millimetres, diastolic, and she had gained eight pounds in the previous month. She was advised to rest and to diet, and was given "Luminal". At thirty-one weeks her blood pressure was 170 millimetres of mercury, systolic, and 96 millimetres, diastolic, and she was sent home to bed. The patient was not examined in the following week owing to the out-patient department's being closed for the Christmas holidays. Immediately after the holidays the patient reported with urine containing "one-quarter" albumin, some oedema of the ankles and a blood pressure of 195 millimetres of mercury, systolic, and 100 millimetres, diastolic. She was then admitted to hospital for treatment. The next day she came into labour and had one fit. The baby was born after two and a half hours' labour, but the patient had five more fits and died five hours after confinement.

In the opinion of the committee the doctor was in error in not admitting the patient to hospital at thirty-one weeks when her blood pressure was 170 millimetres of mercury, systolic, and 96 millimetres, diastolic, and she had also had a history of excessive weight gain.

CASE 58.—A woman, aged thirty-nine years, had a history of eight previous pregnancies. She had attended the out-patient department regularly, where she was found to be putting on weight irregularly but excessively. At the eighth month she had a deposit of albumin in her urine and had gained six and a half pounds in two weeks. She was sent home from hospital, and told to rest and to take a certain diet, her blood pressure at this time being 130 millimetres of mercury, systolic, and 80 millimetres, diastolic. Increasing oedema of her feet and legs supervened, together with nausea and headaches, and eleven days later she had her first eclamptic fit. The ambulance was sent for and another fit occurred during her transfer to hospital, and a third immediately on her admission. On the patient's admission to hospital she was found to have massive oedema of the legs, a blood pressure of 170 millimetres of mercury, systolic, and 110 millimetres, diastolic, and urine "solid" with albumin. Labour was induced and the patient was delivered of a stillborn infant, but she died one and a half hours later, in spite of the intravenous administration of dextrose, heavy sedation and venesection.

In the opinion of the committee the hospital was in error in sending the patient home. When a patient is admitted to hospital with albuminuria due to toxæmia, she should not be discharged till she has been delivered.

The following histories indicate negligence on the part of the patient or her relatives. The following are examples of neglect on the part of the patient to attend, or of her relatives to persuade her to attend for pre-natal care or to follow advice.

CASE 26.—The patient, a *multipara*, aged twenty-seven years, had a history of three previous normal pregnancies. In this pregnancy she did not report for ante-natal care at all until she was five months pregnant, and then attended the clinic only at irregular intervals. At thirty-six weeks the patient was found to have a raised blood pressure and was advised to enter hospital for treatment. She refused, and was given phenobarbitone and a potassium citrate mixture. One week later admission to hospital was again

refused. The patient did not attend the clinic again for a further two weeks, when she was immediately admitted to hospital with "solid" albumin and severe hypertension (systolic blood pressure 210 millimetres of mercury, diastolic pressure 120). The same night an eclamptic fit occurred, and labour commenced. Eight fits occurred before delivery, and further fits after the delivery of a stillborn infant. The patient became unconscious, her condition deteriorated and death occurred four days later.

CASE 1.—The patient, aged thirty-two years, had a history of kidney trouble with two previous pregnancies. The first pregnancy had ended in an instrumental delivery at seven months; the second had resulted in intrauterine death of the fetus at six months. At the patient's first visit to the ante-natal clinic at five months, her blood pressure was 170 millimetres of mercury, systolic, and her diastolic pressure 90 millimetres; she did not attend for another month, when the blood pressure had reached 200 millimetres of mercury, systolic, and 110 millimetres, diastolic. She was admitted to hospital, and there was considerable reduction of the blood pressure to 150 millimetres of mercury, systolic, and 90 millimetres, diastolic, with occasional albuminuria. She left hospital for urgent domestic reasons and twice refused to re-enter hospital at the thirty-second and thirty-fourth weeks. She did not attend hospital again until admitted with a "show", a blood pressure of 230 millimetres of mercury, systolic, and 130 millimetres, diastolic, "one-third" albumin in the urine, and oedema of the face. Labour began twenty-four hours later. She had four fits before delivery, which was by easy low forceps extraction. Her condition deteriorated rapidly, and she died twenty-four hours later.

CASE 12.—The patient, a *primipara*, aged twenty-nine years, had attended her own doctor for ante-natal care. When three months pregnant she had slight vaginal bleeding, but refused to go to bed. The pregnancy proceeded normally after this, with normal urine and blood pressure around 120 millimetres of mercury, systolic, and 75 millimetres, diastolic, until pregnancy reached thirty-six weeks. At this time her doctor went on a holiday, and the patient refused to consult his *locum tenens*, in spite of severe headaches. Two weeks later the *locum tenens* was called to her home, and found her very oedematous, with raised blood pressure (150 millimetres of mercury, systolic, and 70 millimetres, diastolic) and the urine "solid" with albumin. She was admitted to a local hospital, given a blood transfusion and then examined by a consultant, who transferred her to a public hospital. The uterus was very tense and tender, and her condition was diagnosed as severe preeclampsia with an accidental hemorrhage. She was comatose, with Cheyne-Stokes breathing, and the urine contained "half" albumin. In spite of active treatment the patient died unconfined four hours later.

Other Toxæmias.

"Other toxæmias" include acute yellow atrophy of the liver and other toxæmias of pregnancy and the puerperium. Of the 20 cases of other types of toxæmia, eight were regarded as preventable. In three of these the fault lay with the patient, who refused to attend regularly for ante-natal care. In five cases the committee considered that the judgement of the medical attendant had been at fault. In three of the five cases it was considered that pregnancy should have been terminated much earlier.

In one case induction of labour was begun without the patient's being allowed a preliminary rest period in hospital, while in the fifth case the doctor failed to give adequate pre-natal care to a mother who had previously had a Caesarean section for kidney trouble.

Case Histories.

CASE 22.—The patient, a *primipara*, aged twenty-seven years, had attended for pre-natal care regularly. She had raised blood pressure and had gained an excessive amount of weight in each of three successive months. At the seventh month she had a blood pressure of 150 millimetres of mercury, systolic, and 110 millimetres, diastolic, and was given a diet with rest; in a week her blood pressure was 130 millimetres of mercury, systolic, and 90, diastolic, but she had still gained one and three-quarter pounds in weight. She was not examined again for a fortnight, when her blood pressure was 150 millimetres of mercury, systolic, and 85 millimetres, diastolic. She had headaches and spots before her eyes; the urine was still clear, but she had swelling of the hands and feet. One week later she still had oedema, her blood pressure was 160 millimetres of mercury, systolic, and 120 millimetres, diastolic, and her urine contained "one-third" albumin. Only then was she admitted to hospital. Her condition did not improve much, and medical and surgical

induction of labour was carried out five days later. Labour started next day, but was not completed for thirty-six and a half hours. Thirty-six hours later again she developed a severe pain in her chest, which became progressively more severe, with acute tenderness in the right hypochondrium. The patient became very shocked, and she died suddenly next day. Post-mortem examination revealed acute yellow atrophy of the liver.

HÆMORRHAGE OF PREGNANCY AND HÆMORRHAGE OF CHILDBIRTH.

Forty-five mothers in all died from hæmorrhage in the years 1944 to 1949. In the year 1944 there were 13 deaths, in 1945 seven deaths, in 1946 six deaths, in 1947 four deaths and in 1948 and 1949 five and ten deaths respectively. These did not include deaths due to ectopic gestation or abortion.

These 45 deaths from hæmorrhage were classified as follows: *placenta prævia*, 10; accidental hæmorrhage, 4; post-partum hæmorrhage, 30. No history was available in one case.

Age and Parity.

The great majority of deaths occurred among patients aged over twenty-five years, but there were two in the age group fifteen to nineteen years. Six patients were in their first pregnancy, whilst the remainder were *multipare*, two of these being in their tenth pregnancies and one each in their twelfth and fourteenth.

Primary Avoidable Factors.

Seventeen deaths were considered to have been preventable and 28 non-preventable. Of the 17 preventable deaths, four were due to inadequate pre-natal care, the fault of the mother; 13 were due to errors in judgement on the part of the doctor. Of these errors, failure to use the blood transfusion service was the primary avoidable factor in five cases, and the failure to administer saline or plasma while awaiting the blood transfusion unit the avoidable factor in one case. Blood transfusions, one or more, were given in 31 cases. In 13 cases no blood transfusion was given, and two of these patients died before the blood transfusion unit arrived, and another was given plasma but no blood. The numbers of fatal cases in which no transfusion was given were as follows: four in 1944, four in 1945, two in 1946, and only one in 1948 and 1949.

Placenta Prævia.

Of the ten cases of *placenta prævia*, in seven the placenta was situated laterally and in three centrally. Death was not considered to be preventable in any of these cases. All available treatment had been given.

Case Histories.

The following are examples of the management of one of the cases of central *placenta prævia* and one of the cases of lateral *placenta prævia*.

CASE 59.—The patient was a *multipara*, aged thirty-four years. Her first pregnancy had been ectopic; the second was normal, and the baby weighed nine pounds ten ounces. Her third pregnancy was normal until thirty-three weeks, when she was admitted to hospital with slight painless vaginal bleeding. This recurred in small amounts only for the next three weeks; then a severe hæmorrhage occurred. The patient was shocked, and this condition was treated; then lower segment Caesarean section was performed, and central *placenta prævia* was found. A baby weighing six pounds seven ounces was born alive, but was in a state of *asphyxia pallida* and died about one and a half hours after delivery. As the operation was being completed the patient's pulse became rapid, and she died thirty minutes after completion of the operation. No post-mortem examination was performed.

CASE 6.—The patient, a *primipara*, aged forty-one years, had received regular pre-natal care through a normal pregnancy. She was admitted to hospital at term with a history that pains had begun that afternoon. The membranes were intact, the blood pressure was 140 millimetres of mercury, systolic, and 95 millimetres, diastolic, and the urine was normal; but there was slight oedema of the hands and feet. The baby was large and the breech was presenting. Vaginal examination showed the os to be nearly fully dilated. The following morning the breech was still high, and a Caesarean section was decided on. The lower segment operation was performed, and a lateral *placenta prævia* was discovered on the anterior wall of the uterus below the incision line. Blood loss was considerable, but was controlled by pressure after

removal of the placenta. Although her condition was fair at the end of the operation, the patient suddenly became cyanosed and died within ten minutes of completion of the operation. There was no post-mortem examination.

Accidental Hæmorrhage.

Four mothers died from accidental hæmorrhage—two in 1944, one in 1946, and one in 1949.

In one case there was raised blood pressure, but the urine was clear. In another case there was a history of oedema, but no rise in blood pressure; in the third case a doctor was not called in until the patient was moribund; while in the fourth case there was no history of raised blood pressure.

Three women were *multiparæ* (one had twelve children); the ages of these three mothers were twenty-seven, thirty-nine and thirty-five years respectively. The fourth was a *primipara*, aged thirty years. The period of gestation was not known in two cases, but was thirty-six weeks in the third and thirty-nine weeks in the fourth case. Three women died in public hospitals and one in her own home. One was delivered by classical Cæsarean section, one by Cæsarean section with hysterectomy and one by lower segment Cæsarean section, and the fourth died undelivered at her home.

Case History.

The following case illustrates a preventible death.

CASE 88.—The patient was in her twenty-seventh year and had a history of one abortion at three months. She was examined at regular intervals throughout her pregnancy, but not weighed. The urine remained normal, but her blood pressure varied, being 175 millimetres of mercury, systolic, and 90 millimetres, diastolic, on her first examination, then settling to about 145 millimetres of mercury, systolic, and 88 millimetres, diastolic, in mid-pregnancy. At seven and a half months, however, the pressure rose to 144 millimetres of mercury, systolic, and 100 millimetres, diastolic, but the patient was not warned about diet and rest, or admitted to hospital. Fourteen days after this the patient was admitted to hospital in a state of collapse from concealed accidental hæmorrhage. Anuria had existed for some days before her admission. Labour was induced by rupture of the membranes; this was followed by a classical Cæsarean section. In spite of blood transfusion and pre-operative administration of serum, the patient's condition deteriorated rapidly and she collapsed and died shortly afterwards. Her blood urea reading was 75 milligrammes per 100 millilitres.

Post-Partum Hæmorrhage.

Thirty-one patients died from post-partum hæmorrhage; two were in the fifteen to nineteen years age group, and one was in her twelfth pregnancy.

Complications.

Complications occurred as shown in the following list. Seventeen cases were complicated by shock, four cases by toxæmia, one case by uterine fibromyoma and two by hydramnios. Another 14 patients had an adherent placenta, while in two cases there was precipitate labour. Forceps had been employed to effect delivery in 14 of the cases, and there was one case of twin delivery.

In some cases more than one complication coexisted; one patient with congenital heart disease and two with valvular lesions were amongst them.

Preventible Deaths.

In 1944 there were seven preventible deaths from hæmorrhage; in 1945 there were two, in 1946 there was one, in 1947 there were two, and in 1948 and 1949 there were three and two respectively. One mother suffering from hæmorrhage died undelivered. Her death was regarded as non-preventible.

Conclusion.

When all the deaths due to hæmorrhage are reviewed, several factors seem worthy of comment: (i) As in the previous five-year survey, by far the greater number of deaths was due to post-partum hæmorrhage. (ii) The need for early recognition and adequate treatment of hæmorrhage occurring during the third stage of labour requires frequent emphasis. (iii) Frequent estimation of the blood pressure should be made in any case of hæmorrhage. It should be kept in mind that if the systolic pressure is allowed to fall below 80 millimetres of mercury the state of shock may become irreversible. (iv) Patients with abnormal conditions

should be carefully watched, and preparation for blood transfusion should be made in all cases in which any relevant abnormality is present. In many of the cases under review blood transfusion was given too late. In several there was a delay of some hours. Now that there are six blood transfusion units in the metropolitan area and also a supply of plasma in almost every public hospital, there can be no excuse for delay in beginning intravenous therapy.

Attention is also drawn to the value of the intravenous or even intramuscular administration of ergometrine in every case of post-partum hæmorrhage. It is specially useful while preparation is being made to remove the placenta manually, as it frequently arrests bleeding. It is also advisable whenever possible to give a blood transfusion before the manual removal of a placenta, the doctor being quite certain that the patient in the meantime does not drift into a state of shock. It cannot be too often emphasized that it is the duty of the doctor in charge of every patient who has a hæmorrhage to run saline or plasma into her veins so as to keep the vein open for the blood when it does arrive. In several cases there was difficulty in getting the blood to flow when the unit arrived, because the vein had become collapsed owing to the extreme condition of the patient.

The following is a case illustrating some of these points.

The patient had a history of one normal confinement three years previously. Her second pregnancy was normal up till three days after the expected date of labour. She complained of being very uncomfortable on account of varicose veins, and was admitted into hospital for induction of labour. The membranes were ruptured and labour began the following day. The fetal heart sounds stopped suddenly, and as the head was showing, forceps were applied and an easy delivery was effected. The placenta was expelled normally twenty-five minutes after the child was born. There was a normal amount of hæmorrhage. About one and a half hours later the patient collapsed suddenly. The doctor was called, arrived fifteen minutes later, and immediately telephoned the blood transfusion unit. This arrived one hour after the patient's collapse, and the doctor found such difficulty in getting a needle into the patient's veins, which were all collapsed, that another hour elapsed before the blood could be run into one of the veins. The pulse was imperceptible at this time. The patient's condition improved slightly, but she became comatose and died the next day. (v) In some cases it seems that insufficient effort was made to remove the placenta. The following four cases are illustrations of this.

CASE 128.—The patient, a *multipara*, aged twenty-seven years, had had one previous full-time normal pregnancy two years before. She had regular ante-natal care in her second pregnancy and everything was normal. She was admitted to a private hospital in labour about one week after her expected date. After she had been eight hours in labour the baby was delivered by easy forceps traction under "open" ether anaesthesia, with premedication of one-sixth of a grain of heroin. When the patient recovered consciousness she appeared well, but the uterus would not contract. Gentle fundal massage was applied with no effect, but no drugs were given. The patient rapidly became shocked and was given 500 millilitres of plasma, with no improvement in her condition. The patient died one and a half hours after delivery; the blood transfusion unit had not been called. The placenta was still in the uterus, no attempt at its manual removal having been made. There was no post-mortem examination.

CASE 146.—The patient, a *multipara*, aged twenty-seven years, had some ante-natal care and was normal throughout pregnancy. She was confined of a stillborn infant in the ambulance several minutes before arrival at a district hospital. The medical officer at the hospital carried out resuscitation measures on the child without response, although the mother was having severe hæmorrhage at the time. No effort was made to expel the placenta, and the patient was transferred to a public hospital, where the placenta was immediately expelled by abdominal pressure. In spite of the intravenous administration of serum followed by blood transfusion, the patient failed to respond and died several hours later.

CASE 86.—The patient was a *multipara*, aged thirty-seven years, having had one previous normal pregnancy. She had had some care during the pregnancy under review, and appeared normal until term, when she was admitted to a private hospital with slight irregular contractions. The presenting part was very high, and a hard lump was felt on the right side of the uterus. A vaginal examination was made and the lump was diagnosed as a fibroid tumour. The

membranes were ruptured by this examination, and the contractions became regular but weak. Five and three-quarter hours later the patient was delivered by low easy forceps traction, but the placenta would not separate. Two attempts only were made to expel the placenta by Credé's method, as the doctor wished to avoid a manual removal after an instrumental delivery. Two hours later the patient collapsed, though it was stated that there had been no excessive haemorrhage. The doctor telephoned an obstetric consultant, who advised blood transfusion; but the patient died as this was being given, five hours after delivery, with the placenta still retained. There was no post-mortem examination.

CASE 60.—The patient, a *primipara*, aged twenty-three years, had had regular ante-natal care until the ninth month and was well until the commencement of labour. She was admitted to hospital after the membranes had ruptured, with uterine inertia. At full dilatation the position of the fetus was found to be posterior with some possible disproportion, and the patient was transferred to a second hospital after thirty-six hours in labour for a possible Caesarean section. After the patient's transfer labour continued for a further sixteen hours, when forceps were applied and a stillborn infant was delivered with difficulty. Intra-partum and post-partum haemorrhage occurred and continued in spite of the administration of oxytocic drugs. The placenta remained *in situ*, and was removed two hours later, when the patient's condition was very poor. Glucose saline solution and two blood transfusions were then given, but the patient died shortly afterwards.

In some cases—admittedly a very small proportion of the total—death was considered to be preventable, and due to inadequacy of existing facilities to meet the needs of the case. In the following case an error in management coexisted with the failure of existing facilities.

CASE 46.—The patient, a *primipara*, aged twenty-eight years, was examined regularly during pregnancy and was normal. She was admitted to hospital at term in labour, but in a state of primary inertia. After rest and sedation the contractions became stronger and the os fully dilated. The baby was delivered by a simple low forceps operation. Thirty minutes after the delivery, the fundus had risen in the abdomen and the patient complained of pain. Credé's method to expel the placenta was tried, but failed. After one hour the doctor in charge thought the placenta must be adherent, and he got into touch with the blood bank for a supply of blood for a transfusion. Manual removal of the placenta was delayed pending the arrival of the blood, but in view of the patient's condition removal was commenced two and a half hours after delivery, with plasma transfusion only. The placenta was peeled off the fundus with great difficulty, and the patient's condition was fair. The blood arrived shortly after the operation, but the patient's condition deteriorated rapidly and she died before the transfusion was completed.

In another case death was considered to be preventable owing to the patient's own neglect of ante-natal care and error in management.

CASE 16.—The patient, a *multipara*, aged thirty-eight years, had had five previous pregnancies. During this pregnancy she had had no antenatal care whatever, and was admitted to a public hospital in a shocked condition with moderately severe haemorrhage *per vaginam*, which had continued for some time. Examination of the urine revealed "half" albumin on her admission to hospital. The fetal heart sounds were doubtful. Vaginal examination revealed a marginal *placenta praevia*. A classical Caesarean section was performed with the delivery of a stillborn infant. A retro-placental clot was present. Blood transfusion was begun after the operation. The patient's immediate post-operative condition was fairly good, but deteriorated rapidly, and she died the following day.

INFECTION DURING CHILDBIRTH AND THE PUERPERIUM.

There were 54 deaths from infection during childbirth and the puerperium in the six years 1944 to 1949 inclusive. Twenty occurred in 1944, eight in 1945, seven in 1946, nine in 1947, six in 1948 and four in 1949, the average being nine *per annum*.

The average number of deaths during the previous four years had been 20 *per annum*. The dramatic drop in 1945 was probably due to penicillin becoming available for civilian use.

The specific causes of the 54 deaths were as follows: puerperal infection—that is, septicæmia resulting from infection of the genital tract or its adnexæ, puerperal pyelo-

nephritis, pyonephrosis *et cetera*, 18; puerperal thrombophlebitis, five; puerperal embolism, 31. The sepsis in these cases occurred in the following circumstances (in some cases one or more conditions existed at the same time, hence no total is shown): normal labour 21, Caesarean section 10, forceps delivery 12, manual removal of placenta 4, surgical induction of labour two, other complications—for example, prolonged labour, haemorrhage *et cetera*—17.

Twenty-one of the deaths followed normal labour. In nine cases death followed Caesarean section, and in others the clinical picture was one of a mother exhausted by a long, complicated and difficult labour and accompanying blood loss, the stage thus being set for the patient to be overwhelmed by infection.

TABLE IV.

Number of Cases in which Bacteriological Examination was Made.

Year.	Total Number of Cases.	Number Investigated.
1944	20	9
1945	8	6
1946	7	2
1947	9	4
1948	6	1
1949	4	0
Total	54	22

In the four cases of death classified as due to infection in 1949, the immediate cause of death was embolus.

It will be noted that although 22 out of 54 cases were investigated bacteriologically, in many cases death occurred so rapidly that there was no time for bacteriological investigation, and thus no effective search was made to discover the source of infection.

TABLE V.

Organisms Isolated in Vaginal Swabbings and Blood Cultures.

Year.	Hæmolytic Streptococci.	Staphylococcus Albus.	Bacillus Coli Communis.	Anaerobic Streptococci.	Non-Hæmolytic Streptococci.
1944	2	2	4	4	8
1945	1	2	3	1	5
1946	—	—	1	1	2
1947	—	1	4	—	5
1948	—	—	1	—	1
1949	—	—	—	—	—
Total	3	5	13	6	21

In one case the mother had a paronychia on her finger. In only nine of the fatal cases were blood cultures attempted, and only two of these gave a positive result. In one case non-hæmolytic streptococci and *Clostridium welchii* were grown, and in the other *Clostridium welchii* only was grown.

Conclusions.

Theoretically deaths from puerperal infection are considered to be preventable, but the committee is of the opinion that from a practical point of view it is not possible for medical attendants to prevent infection in all cases. The errors in management, however, were classified as follows: (i) lack of bacteriological investigation, (ii) lack of appreciation of the fact that this investigation should be made early in the infection, (iii) lack of replacement of blood lost, (iv) error in aseptic and antiseptic technique, (v) failure to estimate the degree of disproportion or contracted pelvis, (vi) failure to seek a consultant's opinion in cases of long labour, (vii) defective pre-natal care.

Case Histories.

In one case, lack of pre-natal care—the fault of the patient's leaving hospital against medical advice—was held responsible for her death. This patient did not attend for ante-natal care during the ninth month, and was admitted

to hospital in a toxæmic state. She also left hospital against medical advice.

CASE 10.—The patient, a *multipara*, aged thirty-four years, had a history of four previous normal pregnancies. She had regular ante-natal care, but did not attend during the last month. At term she was admitted to hospital in labour with general oedema, blood pressure of 160 millimetres of mercury, systolic, and 105 millimetres, diastolic, and urine half solid with albumin. Delivery of twins followed a normal labour. The patient's blood pressure settled to normal, but she remained very debilitated and had a slight rise in temperature at the fourteenth day. She left hospital against medical advice, and four days later was admitted to another hospital for blood transfusion for profound anæmia, and

TABLE VI.
Seasonal Incidence.

Month in Which Death Occurred.	Number in Each Month.	Number in Each Quarter.
January	5	9
February	2	
March	2	
April	6	14
May	4	
June	4	
July	7	21
August	7	
September	7	
October	2	10
November	4	
December	4	
Total	54	54

left after two days. One week later she became very distressed and was admitted to a public hospital with generalized oedema, enlargement of the liver, and dyspnoea accompanied by a cough with blood-stained sputum. Her urine was solid with albumin, and her blood pressure was 150 millimetres of mercury, systolic, and 110 millimetres, diastolic; her pulse rate was 130 per minute and her temperature was 101° F. She was given penicillin, "Digoxin" and "Salyrgan", but after an initial improvement she collapsed and died. Post-mortem examination showed death to be due to puerperal infection with pulmonary infarction.

TABLE VII.
Preventible and Non-Preventible Infection.

Year.	Preventible.	Non-Preventible.	Total.
1944 ..	6	14	20
1945 ..	2	6	8
1946 ..	1	6	7
1947 ..	2	7	9
1948 ..	1	5	6
1949 ..	0	4	4
Total ..	12	42	54

The following case illustrates gross mismanagement by the patient's doctor, as well as the clinical picture of a mother exhausted by a long complicated labour, when the stage is set for infection.

CASE 110.—The patient, a *primipara*, aged eighteen years, attended regularly for ante-natal care and was normal throughout pregnancy. She had booked a doctor and nurse to attend her at home, and when labour began called in the nurse, who found that there had been a "show", but contractions were few and weak and dilatation was slow. The nurse visited the patient twice a day and spent two nights with her, making several vaginal examinations. The doctor was called in and also examined her. On the third day the patient seemed exhausted, and her pulse was rapid though the cervix was still only three-quarters dilated. The doctor was sent for and applied forceps to the head, but with no result. The patient's condition deteriorated still further, and she was sent to hospital with a temperature of

102° F., the cervix still not fully dilated and the head above the brim. A stillborn infant was delivered by a difficult instrumental delivery and the placenta was expelled. The patient was given "M & B 760"; her temperature continued to rise, and she died thirty-six hours after delivery. Post-mortem examination revealed infection of the uterine wall and acute hepatic necrosis. Bilateral tentorial tears were present in the child.

The following case illustrates faults in management on the part of the doctor and lack of cooperation by the patient.

CASE 53.—The patient, a *multipara*, aged thirty-nine years, had had ten previous pregnancies and did not seek ante-natal care until the seventh month of this pregnancy, when she was found to weigh eighteen stone four and a half pounds. She did not return to the clinic until six weeks later, when she weighed eighteen stone thirteen and a half pounds. The urine and the blood pressure readings were normal. The patient entered hospital thirteen hours after labour had begun, and one hour after the membranes had ruptured the head was presenting, but above the brim. There was no advance in six hours, although the presenting part was found to be low. Examination of the patient under anaesthesia revealed a brow presentation with a constriction ring at the foetal neck. Two efforts were made to deliver the foetus with forceps after extending the foetal head. These were unsuccessful, so a lower segment Cæsarean section was performed, and a live infant weighing eleven pounds six ounces was delivered. The patient's condition was satisfactory, though she had been two hours under the anaesthetic. A blood transfusion was given and penicillin treatment instituted. The next day there was pronounced abdominal distension with slight vomiting, which persisted for two days with a rise in temperature to 101.8° F. The next day the vomiting still persisted, and the patient became more distressed, with sero-sanguineous fluid oozing from the wound. The vomitus became dark brown and offensive on the following morning, and the patient collapsed and died suddenly. The post-mortem examination revealed enormous dilatation of the stomach and intestine to the splenic flexure, with no evidence of obstruction or torsion.

The following case illustrates error in management, when a patient with a previous history of adherent placenta was confined in a small private hospital by a midwife only.

CASE 34.—The patient, a *multipara*, aged twenty-three years, had a history of two previous full-time deliveries, during both of which there was difficulty in removal of the placenta. In the present pregnancy, after a little ante-natal care, she was admitted to a small hospital in labour. Delivery was normal, but hæmorrhage began immediately after it. Three doctors were telephoned, but were out, and finally a fourth doctor came and manually removed the placenta. The patient was in a state of severe collapse, and her temperature rose to 101° F., reaching 103° F. on the fifth day, in spite of medication for one week with "sulpha" drugs. In the second week a cough developed and the lochia were offensive. Pain in the chest, with rapid shallow breathing (36 respirations per minute), a temperature of 102° F. and pulse rate of 124 per minute necessitated the patient's removal to a public hospital. There was no response to the administration of further "sulpha" drugs, and four days later the patient's left leg became swollen and tender. Her condition deteriorated and she died the next day.

ECTOPIC GESTATION.

Yearly Comparison.—In 1944 there were two deaths from ectopic gestation, in 1945 one, in 1946 two, in 1947 four, in 1948 four, and in 1949 one.

Parity.—Eight of the thirteen women were *primiparæ*, three had had one previous pregnancy, one had had two previous pregnancies and one had had three. In one case the parity was unstated. In one case the patient had a history of an ectopic gestation eight years before.

Cause of Death.—The causes of death were as follows: hæmorrhage, 11 cases; acute dilatation of the stomach, one case; pulmonary embolism, two cases; peritonitis, one case; pulmonary tuberculosis and pneumonia were contributory causes in one case.

Blood Transfusion.—Blood transfusions were given in ten cases.

Preventible Deaths.—On the information supplied to the committee it was considered that six out of the fourteen deaths should be classified as preventible. The primary avoidable factor in three cases was failure to recognize and diagnose the condition. In each of these cases the condition had been diagnosed and treatment given as for an abortion. In one case the patient had had a curettage of the uterus one week before the ectopic pregnancy caused

rupture. In another case the patient was an unmarried girl and denied the possibility of pregnancy.

CASE 5.—The patient, a *primipara*, aged twenty-eight years, had been under treatment for sterility. She was admitted to a private hospital with free hemorrhage *per vaginam* and her uterus was curetted after a diagnosis of miscarriage had been made. Blood loss was moderately severe after the operation, and she was discharged from the hospital in three days. Six days after her discharge she was seized with sudden severe abdominal pain and had all the symptoms and signs of a ruptured ectopic gestation. She was

TABLE VIII.
Interval between Operation and Death.

Length of Time after Operation.	Number of Deaths.
Immediately afterwards	3
Within 24 hours	9
24 to 48 hours	7
48 hours to 7 days	13
7 to 14 days	5
14 to 21 days	3

given an injection of morphine and not transferred to hospital for several hours, when she was in a moribund condition. She was given continuous blood transfusions and artificial respiration for some hours; when her condition had sufficiently improved she was taken to the operating theatre, where left salpingectomy was performed. Her condition improved and she was reasonably well the following morning, but suddenly collapsed, became cyanosed and died within a few minutes. Death was certified as due to coronary occlusion or pulmonary embolus with ruptured ectopic gestation as the contributory cause.

CÆSAREAN SECTION.

Throughout the survey the number of deaths recorded as following Cæsaean section was as follows: 1944, 14; 1945, 4; 1946, 7; 1947, 7; 1948, 6; 1949, 5.

Most of the 41 Cæsaean sections were performed by obstetric consultants. Ten patients died from infection following operation, and their deaths were therefore classified as due to infection; in seven of the cases the cause of death was considered to be hemorrhage; in five other cases death was due to toxæmia or eclampsia.

The remainder included three cases of ruptured uterus, three cases of *placenta prævia*, one of fibromyoma complicating delivery, another of constriction ring and some cases of simple disproportion.

TABLE IX.
Number of Deaths Due to Abortion.

Year.	Septic Abortion.	Non-Septic Abortion.
1944	26	3
1945	18	5
1946	8	3
1947	11	5
1948	6	6
1949	8	2

Type of Section.

Of the 41 Cæsaean sections, 17 were of the classical type, 19 were lower segment sections, two were Cæsaean hysterectomies, and in the remaining two cases the type was unknown. In two of the cases of lower segment Cæsaean section hysterectomy was performed a few hours later. From the detailed information before the committee, it was evident that the majority of preventable deaths were due to an error of judgement or management. Out of the 41 cases, 24 deaths were considered to be non-preventable, and the remaining 17 cases were considered to be chiefly due to an error in judgement or management, while in three cases the patient was at fault in not seeking ante-natal care.

Parity.

Eighteen of the patients were *primiparæ*.

Time After Operation.

The time interval between operation and death is shown in Table VIII. One mother died before the operation, and the Cæsaean section was performed to save the baby.

Case Histories.

The following two case histories demonstrate an error of judgement on the part of the medical attendant.

CASE 26.—The patient, a *multipara*, aged twenty-three years, had a history of two previous pregnancies, during one of which she developed toxæmia. She had regular ante-natal care during the present pregnancy, and mitral stenosis was diagnosed. Three weeks from term the patient was admitted to hospital with congestive heart failure and toxæmia. Her blood pressure was 149 millimetres of mercury, systolic, and 80 millimetres, diastolic, and her urine contained "two thirds" albumin; the urine improved under treatment of the patient. Her general condition deteriorated rapidly, however, her colour became dusky and her blood

TABLE X.
Deaths Classified According to the Fifth Revision of the International Lists.

Cause of Death (as Adapted for Use in Australia).	Code Number.	Number of Deaths.	
		Metropolitan Health District. ¹	New South Wales.
Post-abortive infection:			
(a) Spontaneous, therapeutic or unspecified	140a	2	3
(b) Criminal abortion	140b	7	9
Abortion without mention of septic conditions:			
(a) Spontaneous, therapeutic or unspecified	141a		1
(b) Criminal abortion	141b	1	1
Ectopic gestation	142	1	6
Hemorrhage of pregnancy	143	2	2
Toxæmias of pregnancy:			
(a) Eclampsia of pregnancy	144a		6
(b) Albuminuria and nephritis of pregnancy	144b		
(c) Acute yellow atrophy of the liver associated with pregnancy	144c		1
(d) Other toxæmias of pregnancy	144d		1
Other diseases and accidents of pregnancy	145	1	1
Hemorrhage of childbirth and the puerperium	146	4	12
Infection during childbirth and the puerperium:			
(a) Puerperal infections	147a	2	3
(b) Puerperal thrombophlebitis	147a	1	3
(c) Puerperal embolism and sudden death	147c	3	7
Puerperal toxæmias:			
(a) Puerperal eclampsia	148a	3	7
(b) Puerperal albuminuria and nephritis	148b	2	3
(c) Acute yellow atrophy of liver (post-partum)	148c		2
(d) Other puerperal toxæmias	148d		2
Other accidents of childbirth:			
(a) Laceration, rupture or other trauma of pelvic organs and tissue	149a		1
(b) Other accidents of childbirth	149b	3	9
Total	—	32	80

¹ Figures represent the number of deaths that occurred in the Metropolitan Health District.

pressure 170 millimetres of mercury, systolic, and 80 millimetres, diastolic. It was not until thirteen days after her admission to hospital that she was examined by a consultant physician, who advised immediate Cæsaean section and sterilization under local anaesthesia for threatened congestive heart failure, and it was not until four days after this that the patient was examined by an obstetric consultant, who performed Cæsaean section under gas and oxygen anaesthesia, taking only twenty minutes for the operation. Her condition after operation was satisfactory, but three days later auricular fibrillation and congestive heart failure became manifest, and despite treatment with "Digoxin" and other drugs the patient died.

CASE 19.—The patient, a *primipara*, aged forty-four years, had regular pre-natal care and was normal throughout pregnancy. She had a history of a nervous breakdown two and a half years previously and some cardiac weakness. There was some contraction of the pelvic inlet, and at term the head was not fixed and there appeared to be disproportion. Her medical practitioner did not call in a

consultant or consider trial labour, but performed a Cæsarean section. After the operation the patient's pulse rate became very rapid and she was given sulphadiazine. The next day her temperature rose, and abdominal distension was present. A simple enema was given, but her condition deteriorated rapidly, and the distension increased in spite of pituitrin and eserine injections and the passing of a tube into the rectum. She died on the fourth day after operation.

The committee feels that attention should be paid to the present-day management of post-operative distension, obstruction and peritonitis.

TABLE XI.

Deaths Classified According to the Sixth Revision of the International Lists.

Cause of Death (as Adapted for Use in Australia).	Code Number.	Number of Deaths.	
		Metro-politan Health District. ¹	New South Wales.
Toxæmia of pregnancy	642	5	17
Placenta prævia	643	1	1
Other hæmorrhage of pregnancy ..	644	1	2
Ectopic pregnancy	645	1	6
Other complications arising from pregnancy ..	648		2
Abortion without mention of sepsis or toxæmia:			
Spontaneous or unspecified ..	650-0		1
Induced for other reasons ..	650-2	1	1
Abortion with sepsis:			
Spontaneous or unspecified ..	651-0	2	3
Induced for other reasons ..	651-2	7	9
Delivery complicated by placenta prævia or ante-partum hæmorrhage ..	670	1	4
Delivery complicated by retained placenta ..	671		2
Delivery complicated by other post-partum hæmorrhage ..	672	3	6
Delivery complicated by abnormality of bony pelvis ..	673		1
Delivery complicated by disproportion or malposition of fœtus ..	674	1	1
Delivery with other trauma ..	677		3
Delivery with other complications of childbirth ..	678	3	9
Sepsis of childbirth and the puerperium ..	681	2	2
Puerperal phlebitis and thrombosis ..	682		3
Puerperal pulmonary embolism ..	684	2	3
Puerperal eclampsia ..	685		1
Other forms of puerperal toxæmia ..	686		1
Cerebral hæmorrhage in the puerperium ..	687	2	2
Total	—	32	80

¹ Figures represent the number of deaths that occurred in the Metropolitan Health District.

OTHER OBSTETRICAL OPERATIONS.

There were 25 deaths as the result of instrumental delivery or other obstetrical manipulation—for example, craniotomy, version *et cetera*; of these 10 were regarded as preventable, and nine of these were considered to be due to an error in judgement in the management of the case. The types of error demonstrated were delay in calling in a consultant, failure to recognize disproportion, incorrect time chosen for application of the forceps *et cetera*.

Case Histories.

Death in the following case was considered to be preventable, and to be due to negligence on the part of the patient.

CASE 41.—The patient, a *multipara*, aged thirty-nine years, had no ante-natal care whatever in this her ninth pregnancy. She had booked a nurse to attend her at home, and called in the nurse when labour was well started and the cervix half-dilated. The nurse could not feel the presenting part, and the patient insisted on walking about. In two hours the membranes ruptured and a further vaginal examination revealed a prolapsed cord. The nurse then arranged the transfer of the patient to hospital, but she insisted on walking to the ambulance and her uterine contractions, at first satisfactory, ceased altogether. On her admission to hospital the patient was shocked and of an ashen grey colour. An arm and the cord were prolapsed, and these were pushed up and the head brought down and Willett's forceps applied to the scalp. Anti-shock treatment was instituted, but the patient died undelivered two hours after her admission to hospital. Post-mortem examination revealed a com-

plete intraperitoneal rupture of the lower uterine segment, the child and placenta being completely in the abdominal cavity.

CASE 2.—The patient, a *multipara*, aged thirty years, had a history of five previous full-term pregnancies, one of which, the fourth, was terminated by a Cæsarean section for placenta prævia with concealed hæmorrhage. She attended for ante-natal care and was normal throughout this pregnancy. At term she was admitted to hospital in labour, and for twelve hours was watched by a student, who did not recognize that her condition was unsatisfactory.

TABLE XII.

International List Cause of Death: Code Number.		Number of Deaths, 1950, New South Wales.	
Sixth Revision.	Fifth Revision.	Fifth Revision.	Sixth Revision.
642	144a 144c 144d 148a 148b 148c 148d	6 1 1 5 2 1 1	
643	143	1	17
644	143 146 142 145 149b	1 1 6 1 1	1 2 6
650-0	141a	1	2
650-2	141b	1	1
651-0	140a	3	3
651-2	140b	9	9
670	146	4	4
671	146 148a	1 1	
672	146 148b	6 1	6 1
673	149b	1	1
674	147a	1	
677	148d 149a	1 1	3
678	147c 149b	2 7	9
681	147a	2	2
682	147b	3	3
684	147c	3	3
685	148a	1	1
686	148c	1	1
687	147c	2	2
Total	—	—	80

When the consultant was eventually called, it was found that she had continuous pains, especially at the site of the operation scar, and was in great distress, no fetal heart sounds being present. The patient had become greatly shocked and was given a serum transfusion and transferred to the operating theatre, where Cæsarean hysterectomy was performed. A blood transfusion was given during the operation. There was a mid-line rupture of the uterus, six inches long, with free blood in the peritoneal cavity. The patient's condition deteriorated during the operation, and she failed to respond to resuscitation and died shortly after operation.

This death was considered to be preventable, as the hospital staff were at fault in permitting a student to supervise a patient with a complicated history.

CASE 102.—The patient, a *multipara*, aged twenty-five years, had a history of one previous pregnancy ending in a long but normal labour. She had attended regularly for pre-natal care, and was normal throughout pregnancy. At term she was admitted to hospital in labour with very feeble contractions, the membranes ruptured and the head not engaged. Two days later she was examined and found to have a brow presentation, the cervix not being fully dilated. The head was manipulated into an attitude of flexion, and the brow presentation was changed to a vertex presentation, but no progress resulted. Labour progressed very slowly for sixteen hours, when the os became fully dilated, but the head was again presenting by the brow. A consultant was called in, and he applied forceps after manipulation, but still could not deliver the child. Internal version also failed, so perforation and craniotomy were resorted to. The placenta was removed manually. The patient was considerably shocked after delivery, and in spite of the intravenous administration of saline and glucose and blood transfusions,

she died half an hour later. This death was considered to be preventable, owing to failure to recognize the brow presentation until after the membranes had been ruptured for two days.

ABORTION.

The term abortion is employed in this analysis to indicate the expulsion of the product of conception from the uterus at any period up to the twenty-eighth week of pregnancy.

Reliable figures as to the incidence of abortion are not obtainable, because neither the total number of pregnancies nor the total number of abortions is known. The incidence of abortion must be regarded as a factor of serious import to the national birth rate.

The number of deaths following spontaneous abortion was 22, and of those following criminal abortion 79. Of the total 101 deaths, the number due to infection was 77 and that due to other causes 24 (Table IX).

Of the last-mentioned deaths, the causes were as follows: air embolism and shock, 15; hæmorrhage, two; cardiac failure (with acute pulmonary oedema), two; renal failure, three; acute yellow atrophy of the liver, one; acute thyroid crisis, one.

The parity of the 101 patients who died as a result of abortion was as follows: *multiparæ*, 64; *primiparæ*, 33; unspecified, four. Their social state was as follows: married, 75; unmarried, 19; widowed, three; separated from husband, four.

VITAL STATISTICS.

During the years 1944 to 1949 covered by this report, the causes of death were classified in accordance with the fifth revision of the International List of Causes of Death used during the ten years 1940 to 1949. The section of this list relevant to the work of the Special Medical Committee is "Group XI—Diseases of Pregnancy, Childbirth and Puerperal State", which embraces eleven numbered titles with twenty lettered subtitles, and is as follows:

140. Post-abortion infection.
 - (a) Spontaneous, therapeutic or unspecified.
 - (b) Criminal abortion.
141. Abortion without mention of septic conditions.
 - (a) Spontaneous, therapeutic or unspecified.
 - (b) Criminal abortion.
142. Ectopic gestation.
143. Hæmorrhage of pregnancy.
144. Toxæmias of pregnancy.
 - (a) Eclampsia of pregnancy.
 - (b) Albuminuria and nephritis of pregnancy.
 - (c) Acute yellow atrophy of liver associated with pregnancy.
 - (d) Other toxæmias of pregnancy.
145. Other diseases and accidents of pregnancy.
146. Hæmorrhage of childbirth and the puerperium.
147. Infection during childbirth and the puerperium.
 - (a) Puerperal infections, including pyelonephritis.
 - (b) Puerperal thrombophlebitis.
 - (c) Puerperal embolism and sudden death.
148. Puerperal toxæmias.
 - (a) Puerperal eclampsia.
 - (b) Puerperal albuminuria and nephritis.
 - (c) Acute yellow atrophy of liver (post-partum).
 - (d) Other puerperal toxæmias.
149. Other accidents of childbirth (gestation 28 weeks or over, or unspecified).
 - (a) Laceration, rupture or other trauma of the pelvic organs or tissues.
 - (b) Other accidents of childbirth.
150. Other or unspecified diseases of childbirth and the puerperium.
 - (a) Puerperal diseases of the breast.
 - (b) Others.

The classification under the sixth revision (adopted as from January 1, 1950) has made many fundamental changes. The officers of the Bureau of Statistics and Economics point out that if the change in the classification had merely

involved additional rubrics, the rearrangements of categories under the major groups, or the reallocation of diagnostic terms included within a category, a continuing comparison could have been made.

Classification is relatively simple when one cause is involved. When more than one morbid condition contributed to the death, it has been the traditional practice to select one of the conditions as the cause of death. This selection under the fifth revision was effected by an arbitrary system of "preferences" laid down in the "Manual of Joint Causes of Death". The selection of preferences under the sixth revision is now more flexible and is made according to the train of events indicated on the medical certificate.

To demonstrate the changes in classification under the fifth and sixth revisions, the maternal deaths for the year 1950 have been tabulated under the causes in both categories (Tables X and XI). However, the case histories for 1950 are not included in this report.

Table XII shows maternal deaths registered in 1950 classified according to the sixth revision, and the code numbers to which such deaths were allotted under the fifth revision.

ACKNOWLEDGEMENTS.

The committee wishes to record the outstanding service of Dr. E. Sydney Morris, the Director-General of Public Health of New South Wales (recently retired), who has been the chairman of the committee since its inception, and who was formerly Director of Maternal and Baby Welfare. The late Emeritus Professor J. C. Windeyer gave invaluable advice and assistance as a member of the committee, from its inception until his death in 1951. Other members who have served on the committee and whose assistance has been greatly valued are Dr. G. B. Lowe, Dr. A. M. Davidson, the late Dr. A. J. Gibson and the late Dr. H. A. Ridler. The cooperation of the Registrar-General's Department through the district registrars, the officers of the Bureau of Statistics and Economics, the obstetricians, the medical superintendents of public maternity hospitals, the medical practitioners, and the medical, nursing and clerical staff of the Department of Public Health is greatly appreciated by the Special Medical Committee Investigating Maternal Mortality.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

AN ADVERTISEMENT.¹

[*Medical Record of Australia*, Melbourne, July 25, 1862.]

Original Contributions to the Practice of Conservative Surgery by J. G. Beane FRCSE Surgeon to the Melbourne Hospital. Price 7/6.

Contents.

- | | |
|-------------------------------|---|
| 1. Disease of the Hip Joint. | 8. Traumatic stricture of urethra. |
| 2. Chronic hydrarthrosis. | |
| 3. Obstruction of the Bowels. | 9. Exsection of Maxillary Bones. |
| 4. Obstructive dysmenorrhœa. | |
| 5. Neuralgia of the testis. | 10. Anæsthesia—chloroform, ether, amylene, etc. |
| 6. Varicocele. | |
| 7. Abscess of bone. | |

The cases upon which Mr. Beane founds his work are very favourable examples of Conservative Surgery. We have read the work with feelings of very great satisfaction and hope it is not the last we shall receive from Mr. Beane. *Lancet*, 25 August 1860.

This work is of great interest in being the first on surgery published in the colony. It possesses however, other and greater interests, namely that it is founded on cases which occurred in the colony and that it shows a disposition on the part of colonial practitioners to stand forth and claim the position to which their skill entitles them in the scientific world. The author has done what we believe everyone should do who writes a book, and that is, made himself thoroughly conversant with what has been done and is doing by English American French and German surgeons. It is greatly to be regretted that writers both in medicine

¹ From the original in the Mitchell Library, Sydney.

and in surgery do not more generally adopt this plan: they would save themselves much unnecessary labor and from being undeservedly charged with plagiarism, in working at subjects which have long been exhausted by their contemporaries in France and Germany. The book is well written and we trust that Mr. Beane will continue the labor he has so admirably commenced.—Medical Record.

Correspondence.

SOME OBSERVATIONS ON THE USE OF "BREVIDIL E", A NEW MUSCULAR RELAXANT IN ELECTRO- CONVULSIVE THERAPY AND A COM- PARISON WITH "SCOLINE".

SIR: The article on "Brevdil E" by Dr. Val T. Stephen (M. J. AUSTRALIA, March 14, 1953) is full of interest to psychiatrists, but in my opinion fails to do justice to this new relaxant.

For psychiatric purposes "Brevdil E" would seem to have four advantages over "Scoline" and other relaxants:

1. The period from injection to adequate relaxation—about fifteen seconds—is almost ideal, and just sufficient to apply electrodes and give the treatment comfortably. This period can be very accurately measured when thiopentone is omitted, an omission which I think desirable.

2. The duration of action of "Brevdil E" is less than that of "Scoline" and is in fact little longer than the convulsion, and can in some cases obviate the use of oxygen without the patient changing colour.

3. "Brevdil E" has not the same "all or nothing" effect as "Scoline", and it is possible, by dose adjustment, to get some variation in the degree of relaxation, although not to the same extent as with some earlier relaxants.

4. Dose adjustment seems very simple; about 80 to 90 milligrammes usually produce good relaxation (in females).

At the suggestion of Dr. L. E. Rothstadt, "Brevdil E" and "Cardiazol" were mixed in the same syringe in treating

a "cardiac" case, and the period of onset of the two drugs was happily synchronous.

It would seem to me that "Brevdil E" has rendered other relaxants obsolete, and I feel that the real problem is whether it should be used as a routine, or reserved for the patient who is a poor risk for electro-convulsive therapy. Ardis and Wyllie (*J. Ment. Sc.*, January, 1953) state that "unmodified E.C.T. is now out-moded", but their main reason for this statement, the risk of remote arthritic sequelae from crush vertebral fractures, does not seem very impressive. Certainly epileptics have been sustaining these fractures throughout the ages apparently without ill-effect.

A better argument in favour of the routine use of relaxants is the medico-legal one, but in spite of this I feel that at present relaxants should be used only when the patient is a genuine "poor risk".

I think the use of relaxants should be simplified as much as possible. The preliminary use of oxygen and the unnecessary "fussing" of the patient would seem undesirable, and I think that all one should do is to give the injection of "Brevdil", press the button, and have oxygen handy.

Yours, etc.,

R. RAMSAY WEBB.

Receiving House,
Royal Park, N.2,
Victoria.
March 17, 1953.

PROLONGED LOCAL ANÆSTHESIA IN OPERATION WOUNDS.

SIR: Our attention has been drawn to a letter under the above heading in your issue of March 15, 1953.

The letter strays beyond purely medical comment into the realms of commercialism, and as a result has given rise to certain misconceptions. We should be grateful if you would grant us the courtesy of your columns to correct any false impressions.

"Efocaine" is the product of original research by Messrs. E. Fougere and Company, Incorporated, of New York. It is

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 7, 1953.¹

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism ..	1(1)	3(3)	..	..	1	..	..	..	5
Amoebiasis ..	..	..	2	..	..	..	..	..	2
Ancylostomiasis ..	..	..	..	..	..	..	..	..	..
Anthrax ..	..	..	..	..	..	..	..	..	..
Bilharziasis ..	..	..	..	..	1(1)	..	..	..	1
Brucellosis ..	..	..	..	..	..	..	..	..	..
Cholera ..	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus) ..	..	..	..	..	..	..	..	..	..
Dengue ..	..	..	..	..	..	..	..	..	..
Diarrhoea (Infantile) ..	10(9)	2	10(8)	..	2(2)	..	1	..	23
Diphtheria ..	33(27)	6(2)	2	1(1)	..	..	..	..	43
Dysentery (Bacillary) ..	..	3(3)	2	1(1)	..	..	..	..	6
Encephalitis ..	..	..	..	..	..	..	..	..	1
Filariasis ..	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice ..	..	..	..	..	..	1	..	..	1
Hydatid ..	..	..	..	..	..	..	..	..	..
Infective Hepatitis ..	..	5(2)	..	..	10(6)	..	..	..	15
Lead Poisoning ..	..	..	..	..	..	..	..	..	..
Leprosy ..	..	..	6	..	..	..	..	..	6
Leptospirosis ..	..	..	1(1)	..	..	..	..	..	1
Malaria ..	..	..	..	..	..	..	..	..	..
Meningococcal Infection ..	2(1)	2(2)	..	..	2	..	..	..	4
Ophthalmia ..	..	..	..	..	..	..	..	..	..
Ornithosis ..	..	..	..	..	..	..	..	..	..
Paratyphoid ..	..	..	..	..	..	..	..	..	..
Plague ..	..	..	..	..	..	..	..	..	..
Pollomyelitis ..	11(8)	6(2)	9(3)	15(10)	..	4(1)	..	..	45
Puerperal Fever ..	1(1)	..	..	..	3(2)	..	..	..	1
Rubella ..	..	29(14)	..	..	..	..	..	..	32
Salmonella Infection ..	..	..	6(3)	5(3)	2(1)	1	..	..	61
Scarlet Fever ..	15(8)	32(13)	..	..	..	..	..	..	..
Smallpox ..	..	..	..	..	..	..	..	..	..
Tetanus ..	..	..	..	..	..	..	..	..	..
Trachoma ..	..	..	..	..	..	..	..	..	..
Trichinosis ..	..	..	..	..	..	..	..	..	..
Tuberculosis ..	21(15)	30(21)	48(34)	3(2)	7(6)	2(2)	..	..	111
Typhoid Fever ..	1(1)	..	1	..	..	..	..	..	2
Typhus (Flea-, Mite- and Tick-borne) ..	1	..	..	..	1	..	..	..	..
Typhus (Louse-borne) ..	..	..	..	..	..	..	..	..	..
Yellow Fever ..	..	..	..	..	..	..	..	..	..

¹Figures in parentheses are those for the metropolitan area.

now being manufactured in England, under licence, by The Crookes Laboratories, Limited, and supplies from this source provided the first prolonged-action anæsthetic of this type to be commercially available in Australia. There is, therefore, no necessity to consider dollar values for the purpose of making invidious price comparisons. Dose for dose, the price of "Efocaine" will be found to be quite comparable with any imitation at present on the market.

Yours, etc.,

THE CROOKES LABORATORIES, LIMITED.

458-468 Wattle Street,
Ultimo,
New South Wales.
March 27, 1953.

CHRONIC RHEUMATIC (RHEUMATOID) DIARTHROSIS AND THE SHOULDER-HAND SYNDROME.

SIR: In his paper on the above subject in THE MEDICAL JOURNAL OF AUSTRALIA, March 7, 1953, page 330, Dr. Kelly was in error when he quoted Steinbrocker and others (*Ann. Int. Med.*, 1948, 29: 22) and ourselves (*M. J. AUSTRALIA*, 1952, 1: 776) as stating: "Persistent arthritis of both shoulders often spreads to the wrists or the hands." We made no such statement, and, in the reference quoted, we are unable to find a statement to this effect by Steinbrocker and his associates.

Dr. Kelly's paper attempts to show that the shoulder-hand syndrome is just another variety of rheumatoid arthritis. If the papers by Steinbrocker and his colleagues and by ourselves are read carefully, it will be found that there are many differences between the cases which we have described as the shoulder-hand syndrome and those which Dr. Kelly has called rheumatic (rheumatoid) diarthrosis.

Yours, etc.,

JAMES H. YOUNG.
A. T. PEARSON.

Perth,
March 18, 1953.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Clinical Meetings at Balmoral Naval Hospital.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that the following clinical meetings will be held at the Balmoral Naval Hospital during May and June, 1953, at 2 p.m.:

Tuesday, May 12: "Intracranial Tumours", Dr. I. Douglas Miller.

Tuesday, June 16: "Ankylosing Spondylitis and Allied Conditions", Dr. Selwyn Nelson.

Clinical cases will be shown after each lecture. All members of the medical profession are invited to attend.

Deaths.

THE following deaths have been announced:

BROOKS.—Edward James Brooks, on March 23, 1953, at Sydney.

GIBSON.—Stuart Galloway Gibson, on March 23, 1953, at Hobart.

DALY.—John Joseph Daly, on March 24, 1953, at Thornbury, Victoria.

HERLIHY.—William Francis Herlihy, on March 26, 1953, at Sydney.

CUNNINGHAM.—Norman Charles Cunningham, on March 27, 1953, at Sydney.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Sidoti, Eric Dominic, M.B., B.S., 1952 (Univ. Sydney), Griffith District Hospital, Griffith, New South Wales.

Diary for the Month.

APRIL 13.—Victorian Branch, B.M.A.: Finance Subcommittee.

APRIL 14.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

APRIL 15.—Western Australian Branch, B.M.A.: General Meeting.

APRIL 16.—Victorian Branch, B.M.A.: Executive of Branch Council.

APRIL 21.—New South Wales Branch, B.M.A.: Medical Politics Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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